$1.00 a Year

APR 17 1936

50c a Copy

VETERINARY MEDICINE

MAY 1936

CONTENTS

Iowa Wins 18-Year Fight on Tuberculosis 186
Fewer Animals Slaughtered in 1935 187
World Champion Cow a Holstein 187
Dairy Industry Faced with a New Problem 187
Disinfectants and Their Use in Veterinary Practice 190
Standards of Medical Education Growing Lax 199
Differential Diagnosis of Swine Diseases 200
Fatal Internal Hemorrhage in a Horse 202
A Bovine Dermatitis of Nutritional Origin 203
Fatalities From Sitfasts and Other Injuries 204
Post-Vaccination Losses of Swine 205
Salt-Protein Poisoning in the Dog 206
Mastitis from the Manufacturer-Distributor Viewpoint ... 207
Asthenia of the Stifle in Horses 210
Ringworm Infection of Cats 213
The Diagnosis of Pregnancy in the Bitch by Palpation .. 216
Rectal or Postmortem Examination 222
Semi-Rupture of the Prepubian Tendon in a Mare 224
Veterinary Service in Austria 226
Diseases of the New-Born Foal 226
Anesthesia for Castration 226
Pullorum Infection in Eggs 227
Parasitic Paraplegy in Cats 227
The Role of Alimentation in Animal Production 227
Animal Hospitalization in a Small Town 229

VOL. XXXI
No. 5

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879.

75 E. Wacker Drive
Chicago, U. S. A.

SAFE—DEPENDABLE

ANESTHESIA PROMPTLY INDUCED • Nembutal is a short-acting barbiturate. Small doses produce rapid anesthesia.

ONSET OF ANESTHESIA • Intravenous injections, using the external saphenous vein by preference, give prompt anesthesia. These injections should take 3 to 5 minutes. Intraperitoneal injections require 10 to 15 minutes and orally 20 to 25 minutes on the average to produce satisfactory anesthesia.

DOSAGE • However administered, 1/5 grain per pound body weight is suggested dosage. More than 10 grs. is seldom required for dogs weighing 60 to 85 pounds.

EFFECTS • Profound hypnosis of moderate duration with prolonged sedative effect and controlled post-operative excitement and nausea. As a rule no undesirable after-effects.

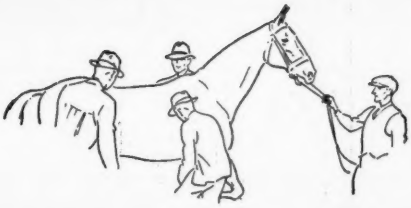
STRYCHNINE POISONING • When used in the early stages of strychnine poisoning, the powerful sedative effect of Nembutal is specific for controlling the convulsions and bringing about relaxation.

LARGE ANIMAL USE • Highly desirable, also, is the pronounced sedative and antispasmodic effect of Nembutal in colic, azoturia and tetanus. 25 to 35 grains is the usual effective intravenous dose for large animals.

Supplied in 20 cc. and 100 cc. Sterile Solution for intravenous and intraperitoneal injection and in bottles of 25 and 100, 1½-grain capsules, for oral use.

NEMBUTAL

ABBOTT LABORATORIES • NORTH CHICAGO, ILLINOIS



A SERIES OF INSPECTIONS PROTECTS YOUR OPERATING SKILL

In the opinion of leading surgeons, the uniformity and keenness of the new improved A.S.R. Surgeon's Blade have never been equalled. Each blade is tested under scientific control where the faintest flaw is instantly divulged. Four separate inspections guarantee their reliability and uniformity at all times.

This is an altogether new achievement in surgical equipment. Developed by intensive research during which surgical authorities were daily consulted. Their keener, stronger edges have won the approval of noted surgeons. Discover the many advantages of A.S.R. Surgeon's Blades for yourself—order from your surgical supply house today! 9 types in all—6 blades to a package.

The coupon will bring you trial blades without charge.

QUANTITY PRICES

Less than 1 gross	$ 1.00 per dz.
From 1 to 4 23/24 grs.	11.40 per gr.
From 5 to 9 23/24 grs.	10.92 per gr.
From 10 grs. upward	10.56 per gr.

» » » **NEW IMPROVED** « « «

A.S.R. SURGEON'S BLADES

TRY THIS FINER BLADE WITH OUR COMPLIMENTS

American Safety Razor Corp.,
Surgeon's Blade Division, Dept. V.M.6
Brooklyn, N. Y.
Kindly send complimentary blades checked below.

☐ 10 ☐ 11 ☐ 12 ☐ 15 ☐ 20 ☐ 21 ☐ 22 ☐ 23 ☐ 24

Name .....

Street .....

City ..... State .....

What the Authorities Say About

CANINE DISTEMPER VIRUS

1 Carefully selected spleen tissue from susceptible dogs which have been infected with virus of known high onset of the attack, Laidlaw and Dunkin demonstrated conclusively that it is present more uniformly and in higher concentration in the spleen. This has been confirmed by other investigators. It is for this reason that spleen tissue virulence is the most satisfactory source of virus. Although the virus is present in other organs, and in the blood at the virus is used exclusively in the preparation of Pitman-Moore Canine Distemper Tissue Vaccine, Virogen and Canine Distemper Virus.

2 Canine Distemper Virus is one of the most delicate viruses known. In its natural state, virulence and viability are quickly lost. Prompt desiccation and refrigeration is the only satisfactory method of preservation. Attempts by Laidlaw and Dunkin, and others, to prepare a live virus for distribution in liquid form, using blood or tissues, proved futile.

No matter what method of distemper immunization you use (Laidlaw-Dunkin; Laidlaw-Dunkin, IMPROVED; or serum-virus) if VIRUS is a part of it, give preference to a live virus processed from the spleen tissues of infected dogs.

PITMAN-MOORE COMPANY

INDIANAPOLIS

A DIVISION OF ALLIED LABORATORIES, INC.

Within this organization originated the policy of sales to Graduate Veterinarians, ONLY.

REFERENCES:

"Some Further Observations on Dog Distemper."—G. W. Dunkin and P. P. Laidlaw, Jl. A.V.M.A., Ap. '31.

At first "we always issued virus in the form of a freshly made suspension of distemper-ferret spleen. * * * It was, however, clearly desirable to secure some more stable product which could be sent for considerable distances without significant deterioration. * * *

"We have since found that carefully dried virus will remain potent for several weeks and we are now convinced that a dry virus is a reliable product, provided that the desiccation is carried out with sufficient precautions. * * * The procedure outlined above should yield a product containing less than 2 per cent of water—as determined by drying to constant weight at 115°C.—and should prove to be virulent after keeping for one month at room temperature. Some of our preparations have proved to be potent after storage for two months and even four months."

"Further Field and Laboratory Observations in connection with Canine Distemper Prophylaxis."—T. Dalling, *Vet. Rec.*, June 6, '31.

Referring to virus: "We realized early that the only possible method to prepare such a product was by some process of drying the infected tissue into a powdered form and then preserving it in such a way that it remained dry. * * *

"Dried virus kept at cold temperature (5°C.) will retain its virulence for many weeks or months."

"Studies in Dog Distemper: III — The Nature of the Virus"—P. P. Laidlaw and G. W. Dunkin, *J. Comp. Path. and Ther.*, Sept. '26.

Referring to viability of blood virus: "We found that dog's blood in broth incubated aerobically at 37°C. for three days was still infective; at six days it was also virulent; at twelve days it was non-infective."

Abs. "Recent Observations on Canine Distemper Immunization."—T. Dalling, *Vet. Rec.*, Nov. 10, '34.

". . . as far as we can see there is no hope of the virus ever being issued in a liquid form."

"Immunization of Dogs."—P. P. Laidlaw and G. W. Dunkin, *J. Path. and Ther.*, XLI, Sept. '28, pp. 209-227.

"In our experience the spleen yields the most constant and most efficient vaccine. * * * If the virus content be high the vaccine will be good."

Veterinary Medicine

Registered in U. S. Patent Office

Vol. 31 **MAY, 1936** **No. 5**

Published Monthly by the Veterinary Magazine Corporation
75 East Wacker Drive, Chicago, Ill., U. S. A.
$4.00 a Year; per Copy 50 Cents.

Copyrighted 1936, by Veterinary Magazine Corporation.

All matter appearing in this publication is covered by copyright, and no part of it may be reproduced without permission. Permission will be granted on request for reproduction of anything in the columns of VETERINARY MEDICINE if the purpose of the reproduction is unobjectionable. Where there is any doubt as to the propriety of reproduction, the wishes of the author will be consulted.

D. M. Campbell, Editor **A. T. Kinsley, Associate Editor**
H. J. Mostyn, 1265 Broadway, New York, Eastern Representative

Potatoes are as rich in Vitamin C as tomato juice.

Calcium gluconate for medicinal use is made commercially from apple waste.

The fifth edition of the U. S. Pharmacopeia (1870), contained only three synthetic drugs—chloroform, chloral, and iodoform.

Military medicine is very old. In the Illiad and the Odyssey, the word used for physician originally meant "extractor of arrows."

An unpasteurized milk supply was blamed by Moline, Ill., health officials for an epidemic of scarlet fever, involving some 50 cases, which took place late in February. Contamination was due to a sick child in the family of the dairyman.

According to Greek mythology, Aesculapius, the founder of medicine, had two daughters, Hygeia the preventer of ills and Panacea the curer. Thus even in antiquity, preventive and curative medicine were recognized as different branches of the art.

House Bill 7901 and Senate Bill 2726 in the National Congress extend to animals transported interstate in trucks the provisions of the present 28-hour law governing interstate shipment of animals by rail. It is a humane measure and as such, deserves the support of every veterinarian.

As early as 1898 it was known that a type of typhus fever (Brill's disease) that was not louse borne, occurred in the United States. Within half a dozen years, it has been shown that this type of typhus is endemic in southeastern United States and that it is communicated from rat to rat and from rats to man by a rat flea.

Until 1930 it was thought that Rocky Mountain spotted fever occurred only in the northern part of the Rocky Mountain region of the United States, chiefly in the Bitter Root Valley in Montana. Recently it has been found this disease is endemic in the southeastern United States. Spotted fever is communicated by the bite of several species of ticks. Under the name of mountain fever, it took a heavy toll of the pioneers in the northwest. At that time, it was thought to be a form of typhoid fever.

Rickets was entirely unknown among ancient Peruvian Indians.

* * * *

The AAA program cut the average per capita consumption of pork approximately ten pounds annually, sending the consumers who normally would have bought this pork to pork substitutes.

* * * *

The tuberculosis death rate in Illinois in 1935 among the white population was 42.2 and among the colored 257 per 100,000 population. The infant mortality rate was 44.2 among white and 70 among colored per 1000 live births.

* * * *

The Federal Bureau of Animal Industry is inaugurating a limited number of field experiments in calf vaccination against Bang's disease. Two to three years will be required to formulate conclusions from the results.

* * * *

Proof that the western sheep disease, "bighead" may be caused by the poisonous coal oil brush and spineless horsebrush plants has been established by the U. S. Department of Agriculture. Mr. A. B. Clawson and Dr. W. T. Huffman of the Bureau of Animal Industry produced the disease experimentally in more than 25 western sheep by feeding them on the two plants.

* * * *

Estimated on a farm value basis, at least 80 million dollars worth of eggs are produced and 25 million dollars worth of poultry are raised each year in Illinois. Mortality is one of the most important and most difficult problems of poultry husbandry. The loss from all causes approaches 40 per cent, annually. Notwithstanding this enormous loss, records of 6,800 specimens examined at the Animal Pathology Laboratory of the University of Illinois indicate that *only twelve per cent* of the owners had consulted local veterinarians. A one hundred million dollar poultry industry certainly presents an important disease problem to veterinarians of this state.—*Robt. Graham.*

NO DORMITORY ZOOS

In an effort to prevent Columbia College dormitories being turned into "miniature zoos," Herbert B. Howe, director of men's residence halls, ordered dormitory students to get rid of their animal pets. This ruling, based on an old statute of the university, affects the home life of three young alligators, seven white mice, three small turtles and several cats and dogs. —*The National Humane Review.*

* * * *

IOWA WINS 18-YEAR FIGHT

State Declared Tubercular Free on December 1, 1935 . . . . Uprising of Farmers Event in Long Struggle

* * * * * * * * * * * * * *

But all of that is past now, the chapter is written and the book is closed. Many men have written their pages in that history and then moved on that others might add additional pages. Dr. Robert Wall who started the campaign, must be remembered as must also Dr. Peter Malcolm, who directed the work for thirteen years with the cooperation of former secretaries, Raymond Cassidy and Mark Thornburg. Nor must we forget men like Doctors Fry and Stewart, Moyer and Gallagher, McCabe and Weires, Axten and Brady, Gorden and Joe Wall and all those others whose work has been invaluable in the program.

But somehow I feel that most of the credit must go to three men, one of whom gave his life in active pursuit of his duties as state veterinarian. The man who more than any other in Iowa solved our troubles in 1933 and ended forever the cow war controversy. What a man he was—What a credit to his chosen profession—a worker, a leader, a diplomat and a square-shooter. He died, alas, without realizing what he had accomplished but in his going the veterinary profession lost one of its noblest practitioners; the State of Iowa one of its most capable servants; and I, personally, one of the most loyal and loving friends any man could ever have. None of us who ever knew him can forget Dr. Noel Bevins.

The other two to whom I refer, happily have finished writing the story. Dr. J. A. Barger, Iowa Representative of the Federal Department of Agriculture, and Dr. H. A. Seidell, State Veterinarian. Each has contributed much to the successful conclusion of the eradication work and each modestly tries to give most of the credit to the other. Both are to be commended and congratulated. We know how they have worked but we also realize how inadequate are words in expressing our sentiments. —Ray Murray, Secretary of the Iowa State Department of Agriculture, in *The Milk Inspector*, Mar. 1936.

FEWER ANIMALS SLAUGHTERED IN 1935

Some of the more important statistical comparisons of federally inspected meat production in 1935, compared with 1934, follow:

Slaughter under federal inspection in each of the two years as follows:

Federal Inspected Slaughter

	1935 Number	1934 Number
Cattle	9,590,242	9,864,547
Calves	5,661,030	6,061,508
Hogs	25,971,565	43,741,346
Lambs and sheep	17,613,914	16,034,976
Total animals	58,836,751	75,702,377

Production of pork in 1935 showed great reduction from the output of 1934, beef and veal production was somewhat less, while lamb showed an increase. Following is the total production under federal inspection for the two years:

Meat Produced

	1935 Lbs.	1934 Lbs.
Beef	4,563,845,524	4,959,494,227
Veal	602,989,388	642,691,536
Pork	4,406,077,642	7,231,441,071
Lamb and mutton	700,662,084	624,009,543
Total meat	10,273,574,638	13,457,636,377

Lard showed a sharp decline in 1935 from the output of 1934. Total production in 1935 amounted to only 662,060,000 lbs. against 1,340,795,000 lbs. in 1934.

Imports Larger, Exports Smaller

An interesting story is told in the import and export of meat and lard in 1935 compared with 1934. While total meat imports were not large, they were double those of 1934, and in the case of exports the total was cut to less than one-fourth of the quantity exported in 1934, owing to the drastic reduction in hog numbers. Figures of imports and exports for the two years follow:

Imports

	1935 Lbs.	1934 Lbs.
Beef and veal	86,537,486	47,968,003
Pork	10,493,859	1,646,613
Lamb and mutton	47,283	11,712
Total	97,078,628	49,626,328

Exports

	1935 Lbs.	1934 Lbs.
Beef and veal	12,609,302	21,883,682
Pork	186,039,568	585,433,253
Lamb and mutton	592,343	593,586
Lard	97,359,436	434,891,690
Total	296,600,649	1,042,802,211

Use Less Meat and Lard

Shortage of pork was again evident in the per capita consumption of federally inspected meat and lard produced in 1935 compared with a year earlier. Per capita consumption of federally inspected meat during the year totaled 83.37 lbs. against 101.23 lbs. in 1934, divided as follows:

Per Capita Consumption

	1935 Lbs.	1934 Lbs.
Beef and veal	41.36	44.05
Pork	36.52	52.25
Lamb and mutton	5.49	4.93
Total meat	83.37	101.23
Lard	4.92	7.29

—*The National Provisioner.*

WORLD CHAMPION COW

"Carnation Ormsby Butter King," a nine-year-old pure-bred Holstein owned by the Carnation milk farms, Seattle, Wash., became the world champion milk and butter producer of all breeds, Feb. 12.

In a 365-day test conducted under auspices of the Holstein-Friesian association of America and the agricultural colleges of Washington, Oregon and Idaho, "Daisy," as the animal is known in the stables, produced 38,606.6 pounds of milk and 1,752.5 pounds of butter. This production broke the 16-year-old milk record and the 13-year-old record for butter production.

Daisy's record is more than eight times that of the average cow. Every two weeks she produced her own weight in milk and more than equaled her weight in butter for a year. Her yearly menu consisted of 11,750 pounds of fresh green feed, 4,380 pounds of beet pulp, 9,125 pounds of sliced beets, 7,300 pounds of grain ration, 730 pounds of molasses, and 9,600 pounds of silage.

Lactalbumin, a milk protein, when used in conjunction with vitamin D increases the rickets-preventing effect of the latter.

* * * *

It is time that parasitology, especially veterinary parasitology, came into its own and claimed a larger share of attention than it has received. With the existing limitations of sanitation as applied to livestock, with the swift change from range conditions to farm conditions, and with our modern transportation system applied to livestock, parasitism is a real threat. Veterinary parasitology is a subject of growing importance and it offers hundreds of problems in morphology and life history work to the zoologist. Its economic importance is a matter of hundreds of millions of dollars annually, and it involves the entire matter of conserving our food supply for our future generations.—*M. C. Hall.*

* * * *

In 1792, Wm. Taplin, in the preface to the 11th edition of his "Modern System of Farriery," wrote: "It must be confessed, it is an ill compliment to a country [England] abounding in sportsmen, and those remarkable for their extreme liberality, that the intellectual faculties of many distinguished members of the different learned societies should be absorbed in obstruse contemplations and intense lucubrations upon the antiquity of a coin, the proboscis of an elephant, the genus of an exotic, or the beautiful variegations of a butterfly; whilst a branch of science and study, involving the health, safety, and preservation, of the most beautiful and esteemed animal this kingdom has to boast, is neglected as derogatory to the dignity of a man of letters: and, from this mistaken idea degradation, a subject of so much consquence has been for many years submitted to the arbitrary dictation of the most illiterate part of the community, without a single effort of weight or influence to abolish the ancient and almost obsolete mode of practice or a single attempt made, from proper authority, to introduce the modern improvements and discoveries in every branch of medicine."

THE DAIRY INDUSTRY FACED WITH A NEW PROBLEM

THE new farm bill enacted by the Congress reminds one of the Sunday school teacher, who told her class: "You should not expect pay for being good. You should be good for nothing."

Some farmers have all along been good farmers in the sense that they conserved their investment—maintained the fertility of their farms by crop rotation, the use of soil-binding vegetation on steep hill sides and the maintenance of a goodly portion of their farms in pasture. Other farmers, and their number is large, have "mined" the fertility of their soil by continuous cropping with depleting crops and permitted unhindered, devastating erosion from wind and water.

The new farm bill provides for the institution of better farming methods among this latter group by paying them to transfer some 30 million acres from cultivated crops to pasture and forage and for adopting a type of farming that lessens erosion.

Because the methods heretofore used by the "good" farmers were suited to live stock production, such farmers, east of the range country, have engaged largely in dairying. *Hoard's Dairyman,* which gives valuable information and sound advice in its editorial columns to help its readers, but permits a choice assortment of fakers the use of its advertising section to loot them, has long been the chief spokesman of this group. This magazine is now sounding off about discrimination against its group; about the inequity, even iniquity, of paying others to be good, while expecting its group to be "good for nothing."

It complains even more loudly, and not without reason, about the unfairness of a plan that must inevitably bring into its field subsidized competition; for there can be no question that the proposed change in farming methods will increase the production of feeds suitable for milk production and thus increase the number engaged in dairying; perhaps most of them in a small way, but in the aggregate, sufficient to deprive the dairy industry, as at present constituted, of

a considerable portion of its market. Since the farm bill proposes to pay only farmers that change from bad to good methods of farming, there can be no subsidy for those whose methods are already good. In their case, virtue must be its own reward. The dairy industry is doubtful that approbation for having done a good job is sufficient reward. It complains that it has received no subsidies heretofore as have other branches of agriculture; apparently forgetting some hundreds of millions of dollars paid it for tuberculous cows that menaced the public, Bang's disease infected animals that were no longer profitable and millions of cattle for which they had no feed, to say nothing of a throttling tax on competing products, its special benefit from hard surfaced roads, etc.

IN this instance, *Hoard's Dairyman* misses the point. There is little, probably nothing, that can be done about farm bills. They come and go in fantastic array. As soon as one hallucination of the Farm Bureau Federation is removed by failure, another develops. Furthermore this farm bill, unlike its predecessors, provides for a sound national policy, notwithstanding fears of maladministration are justified by the record. Good strategy for the dairy industry and *Hoard's Dairyman* lies, not in railing about what probably cannot be cured, but in making the best of conditions thrust upon them. The dairy industry and its chief spokesman have never done much of anything to develop its market. Their attention has been centered upon developing production and stifling competition. There is now and long has been a vast unsupplied market for dairy products in this country. This market can be appropriated by supplying it with good dairy products, pure and wholesome, of far better quality than has ever been available on the general market.

Dairy products do not now have the support of the medical profession. The family physician is, to a large extent, the adviser of the housewife in the matter of food for the family. The unanimous recommendation of the physicians of this country to use more milk and cream and ice cream and butter and cheese would increase largely the consumption of dairy products in a short time. That would create plenty of demand not only for the products dairymen now in the business produce, but for all those that go into the business, incidental to the operations of the new farm bill.

The recommendation of physicians to use more dairy products will not eventuate, however, while the present unsanitary conditions surrounding the production and manufacture of dairy products obtain. The products described in our March issue (page 98) as "Filthy, putrid, moldy, rancid and decomposed," do not deserve and will not be given the unqualified recommendation of public health authorities or of physicians in private practice. Furthermore, both because of unpalatability and for esthetic reasons, such products discourage millions from a greater use of dairy products. These conditions will not be remedied while the industry, through state agricultural departments, supervises the sanitation, inspects and certifies to its own product. The confidence of the public may be attained only by products the cleanliness and wholesomeness of which are certified to by an authority independent of the industry producing them. The public needs such a protection and the dairy industry needs the confidence it would instill and the market it would create. The new farm bill provides neither; nor is the dairy industry, nor agricultural leaders more prescient. They rely upon ignorance of the general public which is not so dense as they assume.

VETERINARY MEDICINE is "for" the dairy industry, unequivocally, but it believes that the best possible service that can be rendered it is to point out the fault that is handicapping it more than anything else and to assist in remedying it to the end that its products may attain the place in the American dietary that they should occupy. The promotion of measures that may enable the industry to merely exist under present conditions is a disservice. Insanitary conditions should be eliminated. Measures that permit their perpetuation inhibit the development of the industry.

Disinfectants and Their Use

By ERNEST C. McCULLOCH, D.V.M., Ph.D.[1]
Philadelphia, Pennsylvania

IN OUR profession,[2] more than in any other division of medical science, we rely upon the results obtained by positive disinfection. In contrast to the physician who can hospitalize his patients and have the most modern devices for aseptic technique at his disposal, the veterinarian must frequently contend with unfavorable environmental conditions which can be altered only insofar as the client can be convinced of the necessity and is financially able to make the necessary improvements. In large animal practice, chemical disinfection furnishes the bulwark of protection against infection, but to employ it with material prospects of success, veterinarians must know what actually constitutes disinfection and also the numerous limitations which surround the use of disinfectants under the conditions of actual practice. Until they attain and use this knowledge, they cannot fulfill their entire responsibility to their clients, for the selection of a disinfectant to kill a given type of microorganism under specific conditions requires as exact a degree of knowledge as the selection of a therapeutic agent for an ailing animal. As animal husbandry becomes more specialized and very dense animal populations become the rule, even greater reliance must be placed in disinfection.

A discussion of the use of disinfectants would be incomplete without a brief resume of the tremendous disinfecting ability of the natural agents, which far exceed all disinfection carried out by man; yet we can do little to enhance their power, and positive disinfection must essentially depend upon physical and chemical agents.

Sunlight.—Most persons realize the benefits to be derived from insolation. Near the close of the eighteenth century, Faure advanced the claim that chronic ulcers of the skin could be cured by exposure to sunlight. In 1890, Palm, an English physician, noted the relationship between rickets and insufficient sunlight; soon afterward, Finsen found that lupus could be cured by localizing the light rays after filtering out the heat rays. In 1903, Rollier demonstrated the success of sunlight in the treatment of surgical tuberculosis. Wounds which are exposed to moderate amounts of sunlight heal more rapidly than those not receiving insolation. Whether this is due to the bactericidal activity of the ultra-violet rays of the sun or to the stimulating effect of the other light rays as well is unknown, but it is known that with ample exposures and sufficient intensity, sunlight exerts a germicidal effect a fraction of a millimeter into the unbroken, normal skin.

Sunlight is definitely toxic to all pathogenic organisms; even diffuse sunlight interferes with the growth and development of many species and, if sufficiently intense, will destroy them. The total time required to disinfect is not changed by intermittant exposure, and organisms exposed to sunlight receive the total effect of all the ultraviolet rays instead of a lethal dose in a single exposure being necessary for their destruction. Much of the germicidal value of the utra-violet rays is lost through their inability to penetrate *debris,* mucus and filth, and they are excluded by ordinary window glass.

Dilution.—Under natural conditions, dilution is a powerful, although frequently overlooked, factor in disinfection. Not only do isolated organisms die because of their inability to supply a sufficient concentration of enzymes for extra-cellular digestion of food, but when a flora of infectious organisms is so dispersed that a susceptible animal does not come into contact with a sufficient number to overcome the natural defenses of the body, they cannot

[1] Biological Research, Development and Research Department, Pennsylvania Salt Manufacturing Company, Philadelphia, Pennsylvania.
[2] Read before the Thirty-Sixth Annual Conference of Veterinarians, University of Pennsylvania School of Veterinary Medicine.

produce disease and thus have been disinfected by dilution alone. This is one of the reasons why lakes and rivers, which receive tremendous numbers of pathogenic microorganisms, do not more frequently serve as vectors of disease. Sedimentation also plays an important part in freeing lakes and streams from contamination.

Time.—When microorganisms are no longer actively reproducing, death is gradually but steadily decreasing their numbers. Their resistance to the passing of time depends upon the species and the environment. The less the concentration of available oxygen and the lower the temperature, the less slowly does the bacterial cell utilize the energy stored within it and the longer it lives. Protected from oxygen and held at a low temperature, practically all microorganisms survive for long periods. Under natural conditions, the non-sporulating organisms die within a few days or months. In contrast, the spores of blackleg, gas gangrene, tetanus and anthrax live many years. Not long ago, I tested anthrax spores which had been preserved in a glass bottle for forty years and found them still able to kill guinea pigs.

The Bacteriophage.—The bacteriophage, which d'Herelle maintains is an ultra-microscopic parasitic disease of bacteria, has its greatest effect and multiplies most rapidly when acting upon bacteria which are reproducing at their maximum rate, thus serving to check their growth when everything else is favorable for their multiplication; but sterilization is so rare as to be of no significance. Always a few resistant cells survive and these multiply even in the presence of the bacteriophage. Clinically, bacteriophage therapy has given the best results in the treatment of staphylococci, colon and paracolon infections.

Antibiosis.—The tendency of certain species of organisms to militate against other species is of especial significance, and while time permits me only in the briefest manner to mention a few instances, perhaps in the future antibiosis will receive much more attention from bacteriologists than it has in the last two decades and be utilized to a greater extent in the control of infections. The common pus organism, *Staphylococcus aureus* destroys diphtheria germs; *Serratia marcescens* is antagonistic to *Bacillus anthracis;* while *Lactobacillus acidophilus* reduces the growth of putrefactive organisms in the digestive tract. Under natural conditions where organisms must compete for each particle of food, those adapted for life in water and in soil soon outgrow most of the pathogenic organisms which are primarily adapted for growth within the body.

The Body Fluids.—Time does not permit a discussion of the phenomenon of immunity and the many protective mechanisms of the body which are involved in the control of infection. However, a few isolated examples are of unusual interest.

Despite the number of bacteria which grow in the mouth, the normal saliva is germicidally active against many types of infectious organisms and the instinct of many animals to lick wounds apparently can be correlated with sound scientific fact. The gastric juice and the intestinal fluids are also capable of destroying several types of bacteria.

The tears exert a strong disinfecting action which accounts for the infrequent infection of the eyes despite their exposed position and delicate structure. The germicidal principle, lysozyme, also is present in the nasal and respiratory tracts, in cartilage, and in egg white. The ability of eggs to resist decay during the period of incubation probably is due to lysozyme. The lysozyme activity is markedly lessened in vitamin A deficiency and xerophthalmia.

The vagina secretes a germicidal fluid which in the healthy animal is capable of destroying many infectious organisms, but its activity is decreased by douching which probably accounts for the high rate of infection in herds where the owner douches the animals frequently. Menstral blood also is somewhat germicidal.

Clean skin has been found to be capable of freeing itself of contaminating organisms, a power not shared by dirty skin in

which the organisms probably are protected by the *debris*.

Amniotic fluid is used in human and veterinary surgery as a non-irritating antiseptic that can be used in the abdominal cavity.

Milk is definitely, although feebly, germicidal. Within a few hours after leaving the mammary gland, this property disappears. Heating destroys its germicidal power. Colostrum exhibits a more positive action.

Bactericidal Properties of Blood.—The protective action of the blood is so well-known as to need little discussion. However, the widely recognized phenomena of precipitation, agglutination and even phagocytosis probably are not responsible for the greater part of this property. The lysin responsible for the destruction of *Bacillus anthracis* and other Gram-positive organisms is heat resistant while the lysin dissolving *Eberthella typhi* and related Gram-negative organisms is not. The thermostable lysins are most active in the blood of sheep; followed by that of the ox, man, white rat, pig, horse, rabbit, guinea-pig and pigeon. The lysins which destroy Gram-negative organisms were most active in the rabbit, followed by the rat, sheep and the ox. Agglutination apparently does not kill bacteria. Extracts of leucocytes have been found toxic to Gram-positive organisms such as the staphylococci and the streptococci, but not to Gram-negative organisms.

Heat.—Moist heat is much more effective than dry heat. Heating bandages or dressings in hot air ovens is not a reliable means of sterilization. The thermal resistance of organisms to dry heat is so great and the rate of penetration through closely rolled materials so slow that the exterior of the dressings will be scorched before even the less resistant organisms in the interior are killed.

Pathogenic organisms can be divided into two groups, insofar as resistance to heat is concerned; those which form spores and those which are non-sporulating. The sporulating organisms, such as *Clostridium tetani, Cl. welchii, Cl. chauvei* and *Bacillus anthracis* are extremely resistant, especially when they are protected by accumulations of dried blood or tissue detritus.

Due to the thermal resistance of the gas gangrene and tetanus organisms, surgical instruments should be thoroughly cleaned before sterilization, and then either sterilized under stream pressure or boiled for at least half an hour. The deleterious effect on instruments of boiling can be somewhat overcome by adding a small amount of baking soda to the water and allowing it to boil vigorously before placing the instruments in the water. This alkalinizes the water and allows much of the dissolved oxygen to escape, thus lessening the tendency to corrosion. Sterilizing instruments in oil, to prevent the cutting edge being dulled, is a form of dry heat sterilization; to be efficacious, the temperature must be high and the period of heating prolonged.

Passing surgical instruments through a flame to sterilize them is a futile procedure, for unless they are maintained in direct contact with the flame for an ample period of time, the contaminating organisms will not be destroyed. Another fallacious practice is that of dipping a scapel or probe in alcohol and then igniting. As the alcohol burns from the surface, the vapors rise and mix with the oxygen from the air. The vaporization of the alcohol has a very decided cooling effect. This, with the insulating action of the blanket of vaporized alcohol and air prevents sterilization. Indeed, the hand can be dipped in alcohol and ignited; as long as plenty of alcohol remains, the temperature attained will not be uncomfortable.

Cold.—Cold protects, rather than kills, most bacteria; only a few such as the gonococci and the meningococci are killed by exposure to low temperatures. As a rule, bacteria and viruses survive longer at temperatures below freezing than at body temperature, although the pathogens cannot grow under these conditions. The diminution of certain diseases during winter probably can be accounted for by the lessened activity of insect vectors, the blanketing of infective discharges by snow, the dilution resulting from the fall and winter rains

and a higher resistance of the animal body to infection during cold weather.

Ultra-Violet Light.—Ultra-violet light as produced by the carbon arc or mercury vapor lamps is germicidal, although the rate of disinfection is slow. Tissues also are sensitive to ultra-violet light and an exposure sufficient to kill organisms on the skin or in a wound would result in cell destruction.

Electricity.—The heat produced by an electrical current passing through a fluid or tissue differs in no way from heat produced by other means and in spite of claims sometimes made, electricity apparently has very little germicidal effect upon bacteria. However, the chlorine liberated by the action of an electrical current in fluids which contain salt, is actively germicidal.

Acids.—The use of acids for dressing wounds dates back to antiquity and recent research shows that against some types of infections, they are extremely valuable. The stronger acids, such as sulphuric, nitric and hydrochloric, kill by the degree of acidity they produce, that is, the hydrogen-ion concentration is the lethal factor. These acids are too corrosive to be used on instruments and too toxic to be used on tissues, while their cost prevents their use in barn and stable disinfection. However, in Germany, sulphuric acid is extensively used as a stable disinfectant. It is ruinous to concrete, which would preclude its general use in this country.

The germicidal powers of the weaker acids appear to be correlated with their ability to decrease the surface tension, the more powerful surface tension depressents being the most active germicides. Vinegar, which is about 5% acetic acid, is a fairly good germicide, being superior to some of the expensive preparations which are sold for oral and wound disinfection. Taylor found 1% acetic acid dressings to be superior to any other disinfectant in combatting *Ps. pyocyaneus* in old wounds and chronic sores. The filtrable viruses also appear to be readily killed by acids.

Boric acid is so ineffectual that it scarcely justifies discussion. A saturated aqueous solution with prolonged exposure will not destroy *Staph. aureus.* However, its antiseptic action is more pronounced. Probably the greatest value of boric acid solutions lies in their mildness and the fact that they do not devitalize tissues.

Salicylic acid likewise is of limited value as a germicide, although recent work indicates that it has the power of detoxifying many bacterial toxins without destroying their antigenic powers. Perhaps this accounts for the excellent clinical results obtained by the use of this drug and related compounds.

The Alkalies.—Against the Gram-negative organisms and the filtrable viruses the strong alkalies have extraordinary germicidal powers. Their low cost, concentrated form, stability and absence of odors should accord them first place when disinfection of dairies, food-processing establishments, barns and chicken houses is being considered. Against practically all of the Gram-negative organisms and the filtrable viruses, a 1:500 lye solution is an effective disinfectant, killing in less than ten minutes. For routine disinfection a dilution of 1:150 is to be preferred, although exceptional conditions may make the use of more concentrated solutions advisable. Experimentally, I have found the 1:150 dilution to be sufficiently strong so that admixture with ordinary amounts of organic matter such as uterine discharges, pus or saliva does not prevent it from exerting its disinfectant power nor does moderate dilution with urine or feces interfere with its germicidal ability. With high-test lye, at 10 cents per can, the disinfectant solution costs but two-thirds of a cent per gallon.

Whitewash, if made from freshly slaked quicklime, is an excellent germicide although much of the whitewash now is made from lime substitutes and is of a low degree of alkalinity and therefore not germicidal. The germicidal powers of such whitewashes can be improved by the addition of lye.

Neither lye or whitewash solutions made from quicklime need be used hot in order to kill bacteria and the common practice of

heating lye solutions appears to be without practical justification. Sal-soda, tri-sodium phosphate, sodium metasilicate and sodium orthosilicate are germicidal according to the degree of alkalinity which they produce, being inferior to lye. However, when they are used hot, they exert a considerable germicidal action, the sal soda being least effective and the sodium orthosilicate the most actively germicidal.

Against the Gram-positive organisms, the alkalies exert a less effective action and a 1% solution of lye should be used; while against anthrax spores, the B. A. I. recommends a 5% lye solution as the disinfectant of choice.

The acid-fast organisms are extremely resistant to the action of the alkalies and lye is not a practical disinfectant where the germs of tuberculosis or paratuberculosis are to be destroyed.

The Heavier Metals.—The heavier metals have two modes of action, that of the metals themselves and that of their salts. Apparently there is no relationship between these two phases, and the disinfectant action of the metals is but imperfectly understood.

Several metals, especially silver and to a lesser degree copper, have the property of killing organisms in solutions which come in contact with the clean, bright surface of the metal. This is especially pronounced when oxygen is present and is accelerated by sunlight. If contaminated water is placed in a bright copper container, all pathogenic organisms will be destroyed within a few hours, and contaminated water which is allowed to flow over silver surfaces is rendered safe to drink. This action, which is called the oligodynamic action of metals, is being extensively utilized in Europe for the purification of water, and in this country in rendering swimming pools safe. Silver foil as a wound dressing has been used but it is not, by any means, as effectual as gauze containing silver manganite or silver thiocelloboise.

The action of the salts of the heavy metals has been a subject of much confusion. In testing disinfectants, portions of the mixture of disinfectant and organisms are transferred to tubes of F. D. A. broth and incubated. If growth fails to occur within two days, the organisms are considered to have been killed. However, we now know that many organisms that have been subjected to the action of metallic salts fail to grow under the conditions of the test but readily infect if introduced into the body. In other words, the salts of the metals form a coating around the bacteria which prevents growth in ordinary media, but this inhibitory power is soon lost when the organisms are in contact with tissues. Since this factor has been recognized, the former high germicidal powers attributed to the salts of heavy metals have been greatly modified and we no longer consider them as infallible germicides.

Bichloride of Mercury.—A 1 to 1000 bichloride of mercury solution was once considered a very powerful germicide; now we know that we can expose the common pus organism *Staph. aureus,* to 1 to 100 bichloride of mercury and later grow it, providing we remove the chemical. Obviously, a contaminated surgical instrument which has been dipped in a bichloride of mercury solution and then used to open an incision would carry the mercury-coated organisms into the wound and later these would grow after the mercury had been removed by competitive adsorption by the tissues.

A widespread but inconsistent procedure is the addition of an acid to the solution in which bichloride of mercury is to be placed or the inclusion of citric acid in the tablet of bichloride of mercury to increase the degree of solubility. This does increase the degree of solubility, but as the liquid becomes acid it approaches the isoelectric point of the bacterial cells. When this occurs bacteria carry the same electrical charge as the mercury ions, and repel each other so that there is no combination between the mercury and the microorganisms, which is essential for bacterial death.

Biniodide of mercury is but slightly more powerful than the bichloride of mercury and is subject to similar limitations. The mercury salts have a rather low coeffi-

cient of dilution and a low temperature coefficient. However, they form insoluble combinations with the organic material in which bacteria may be lodged and are not effective except on relatively clean surfaces or in fluids free from organic matter. Of the mercury compounds, oxymercury cyanide appears to be the least objectionable.

Complex Mercury Compounds.—Veterinarians have been deluged with literature claiming extraordinary bactericidal powers for some of the complex compounds of mercury. Most of the supporting data confuses bacteriostatic action with germicidal powers. Perhaps the most exploited of these compounds is mercurochrome which is not a remarkable germicide and definitely inferior to tincture of iodine. The reaction of the culture is more important than the concentration of the mercurochrome. At the alkalinity of the tissues, the 2% solution usually recommended is not a reliable germicide. The claim that mercurochrome possesses great penetrating power is based upon work in which the mercurochrome was instilled into the bladder of a living rabbit, then the rabbit was killed and the bladder examined; the tissues were found to be deeply stained. However, later work has shown that when the rabbit was not killed, but merely anesthesized and the bladder removed and examined, no such penetration was noted.

Merthiolate, metaphen, mercurophen and other complex mercury compounds have been advocated as non-irritating substances which are strong germicides; such claims have not been substantiated when these compounds were critically tested in the laboratory. That they can not be successfully used as intravenous antiseptics has been shown by Smith, Czarnetzky and Mudd (1936). When these mercurials are mixed with blood serum a certain amount is absorbed and until the equilibrium is reached the mercury compounds exert no germicidal action. Since each liter of horse serum will combine with about 0.4 grams of mercury, the amount that would have to be injected to render the blood antiseptic would be far beyond the lethal dose. Phenyl-mercuric-nitrate, which has been known for a long time, appears to be most powerful of these mercury compounds, and its toxicity is relatively low.

The Silver Salts.—The silver salts are fairly good germicides, although like the mercury compounds, they tend to be bacteriostatic rather than germicidal. Silver nitrate is perhaps the most active and the most irritant to tissues although its penetration is prevented by the formation of the insoluble silver chloride as it comes in contact with the sodium chloride in the tissue fluids. The colloidal silver preparations are not very actively germicidal although argyrol, protargol, neosilvol and others have gained clinical recognition because they prevent further bacterial growth while they remain in contact.

The Copper Salts.—Against some of the algae and higher bacteria, the copper salts are extremely active. In the control of foot-rot infection in sheep they have not been equalled, but against other forms of bacteria, they have little germicidal value. A 15% copper sulphate solution will not kill anthrax spores even with several days' exposure.

Zinc and Iron.—The salts of zinc and iron exert little germicidal action against the pathogenic organisms, although zinc is used to prevent the growth of molds and fungi.

The Phenols.—Phenol has been accepted as the standard and other disinfectants are compared with it. While no longer used as universally as in previous years many people continue to rely on carbolic acid. Almost all vegetative cells are killed by ten minutes exposure to a 1:50 dilution of phenol and many by a 1:100 dilution; a 1:20 dilution is not sufficient to kill resistant spores. Phenol has a high coefficient of dilution and a high temperature coefficient, that is to say, either cooling or further dilution greatly reduces the effectiveness of phenol solutions. It is expensive, caustic to tissues, exerts an anesthetic effect on the skin and has a characteristic and penetrating odor which is absorbed by foods. On the other hand, it is a definite,

stable, chemical compound which readily kills bacteria instead of exerting a bacteriostatic effect. Against the filtrable viruses, phenol is of little value. The degree of acidity or alkalinity greatly influences the efficiency of all phenol compounds as well as the closely related cresols, as they are more effective in an acid than in an alkaline solution.

Bulletins of several agricultural experiment stations continue to recommend the addition of cresol or phenol to whitewash solutions to make them more actively germicidal. Actually the calcium or sodium salts of the phenols or cresols are not germicidal and since some of the alkali is neutralized by combining with phenol or cresol, the resultant product is less germicidal than the alkali solution alone.

The temperature coefficient of phenol should not be overlooked. In recent experiments, the writer found 1:200 phenol at 40°C. to equal a 1:55 solution at 2°C. Moderate amounts of organic matter do not greatly delay the disinfectant action of phenol. Solutions of phenol in oil are not germicidal, although 20% alcohol makes an excellent diluent.

The Cresols.—The cresol emulsions, of which *Liquor Cresolis Compositus* (U.S. P.) is the most familiar, are good disinfectants. Like phenol, they have a high temperature coefficient, 1:400 liquor cresolis at 40°C. equalling 1:90 at 2°C. At room temperatures, most organisms are killed by dilutions of 1:150 to 1:300 although a 2% solution failed to kill the spores of *Bacillus anthracis in* four days, and 5% solution of lysol with five days' exposure was ineffective against botulinus spores.

Many modifications of liquor cresolis are sold, often with statements that their phenol coefficients are 10, 15 or even 20 as compared to the phenol coefficient of 2 to 4 for the official product. These higher phenol coefficients, which are obtained by the official methods and therefore are recognized by the government, represent comparison against *E. typhi* in the absence of particulate organic matter. When tested against *Staphylococcus aureus* or the filtrable viruses and in the presence of organic *debris,* such as is encountered under the conditions of actual disinfection, these compounds appear to have only a slight superiority over the official preparation. While the cresol compounds are not very effective against the filtrable viruses, and for barn disinfection against the Gram-negative organisms are inferior to lye, they are the disinfectants of choice where the germs of tuberculosis are to be killed.

Excessive amounts of soap nullify the action of the cresols, and the practice of adding a small amount of cresol to a soap solution does not have a sound basis.

Alcohol.—Alcohol is a weak germicide. In fact, most samples of ethyl alcohol in hospitals actually contain living organisms. Some bacteria and viruses are killed by 50 to 90% alcohol.

Formaldehyde. — Formaldehyde enjoys an undeserved reputation as a disinfectant. In low dilutions it is bacteriostatic, but it is not a reliable germicide. At 2°C. a 1 to 8 dilution of formalin failed to kill Gram-negative organisms in five minutes. At 40°C. the formaldehyde was approximately ten times as powerful. The disinfection of premises by the use of formaldehyde gas is almost impossible.

Hexylresorcinol.—Hexylresorcinol, which is sold in a 1:1000 dilution, acts primarily as a surface tension depressent; that is, it concentrates around each bit of particulate matter in the solution, and its germicidal power depends largely upon the amount of particulate debris in the material to be disinfected. The effect of surface tension upon disinfecting solutions should be accorded far more discussion, but time does not permit.

The Medicinal Dyes.—For several years, the medicinal dyes have been a favorite plaything for bacteriologists and it is to be regretted that the clinician has, in a few instances, been the victim of premature enthusiasm. The medicinal dyes show a great degree of specificiety, that is, they are much more effective against certain types of microorganisms than against others. Also

they are markedly affected by the reaction of the medium, and they tend to produce bacteriostasis, preventing further multiplication rather than killing bacteria.

The basic dyes, which include gentian violet or crystal violet, brilliant green and pyoktannin blue are specific against the Gram-positive organisms, especially the pus producing cocci. They are more effective when the medium is slightly alkaline than when it is neutral or acid. Used on wounds which are infected with pus-producing organisms, they undoubtedly have a limited place in veterinary medicine.

The flavines; acriflavine and proflavine, have been favored by many veterinarians. They are used in dilute solutions which are relatively non-irritant to the delicate tissues. It was once claimed that the flavines were more effective in blood serum than in peptone broth or even in water. This was based on the assumption that the experiments had been conducted with blood serum of the same degree of alkalinity as that of the blood in the body. In reality, in the experiments the carbon dioxide had escaped from the blood serum which made it much more alkaline, thus making conditions more favorable for the action of the dye. When fresh muscle juice and fresh serum were used, the effective concentration of acriflavine against staphylococci was found to be 1 to 3000 instead of 1 to 200,000 as previously reported. None of the medicinal dyes has proved of value in intravenous therapy.

The Halogens.—This chemical group, which includes fluorine, chlorine, bromine and iodine, have many characteristics in common. Fluorine gas is exceedingly difficult to handle and has no place in disinfection. The use of the compounds of fluorine and bromine as disinfectants has been discontinued, although formerly the fluorides were used to disinfect vats in breweries and were once included in a mouthwash.

Chlorine.—The use of chlorine in medicine is not new, although many believe that it was first used as Dakin's solution during the World War. Approximately a century ago, Oliver Wendell Holmes, the poet-physician, recognized that washing the hands in a hypochlorite solution would prevent the obstetrician from transmitting pueperal fever, while some ten years later, Semmelweiss depended on hypochlorite solutions to stop the appalling losses which occurred in the lying-in hospitals of that time. Today, more disinfection is done each day with chlorine than during an entire year by all other chemical disinfectants combined. This is due largely to the universal adoption of chlorine gas as a disinfectant for water supplies and the chemical treatment of sewage.

Under ordinary conditions, the use of chlorine gas is not practical in veterinary disinfection, although it is conceivable that in cases of epizootics, such as foot-and-mouth disease, that chlorinators might be mounted on trucks to provide ample quantities of heavily chlorinated water as needed to disinfect the premises. Under ordinary conditions, the hypochlorites form the most practical source of chlorine for the veterinarian. Regarding these, almost endless confusion exists although the essential facts have been worked out and are known to all who have investigated this subject.

The chlorine compounds are intensely affected by the reaction of the medium. In fact, acidulating a hypochlorite solution exerts a far greater effect on its germicidal efficiency than increasing the concentration of available chlorine. The germ-killing power appears to depend upon the presence of hypochlorous acid; unfortunately, hypochlorous acid is corrosive to metals and is non-stable. The problem of the hypochlorite manufacturer is to balance the chlorine content of the product against the alkalinity so that the product is as active a germicide as practical conditions demand and at the same time is reasonably stable and non-corrosive. Some of the products which have been offered to the veterinary profession have failed in one or another of these points. If of too low alkalinity, they have been very active germicides but they also have been non-stable, irritant and corrosive; while on the other hand, some have been stable, non-corrosive and non-irritant but very poor germicides in the concentrations recommended. The manufacturer who

claims to have a hypochlorite which is very stable, non-corrosive and non-irritant yet at the same time is a very active germicide, is making claims that are without a scientific basis.

However, a well-balanced hypochlorite approaches as nearly as any compound the perfect disinfectant. In concentrations of 200 parts of available chlorine per million practically all pathogenic organisms on clean surfaces are killed, while Dakin's solution which contains approximately 5000 parts of available chlorine per million is only moderately toxic to tissues. However, critical tests with tissues in cultures and with *Staph. aureus* show that the hypochlorite solutions are slightly more toxic to the tissues than to this organism. This does not mean, however, that these and other organisms cannot be disinfected by means of a hypochlorite solution without causing sloughing, but it does mean that long repeated douching with chlorine solutions of sufficient concentration to kill pathogens is followed by a diminished resistance of the tissues which makes future bacterial invasion more likely.

The hypochlorites have a low coefficient of temperature and a low coefficient of dilution. When *S. pullorum* was used as a test organism, the phenol coefficient of the chlorine was found to be 285 at 2°C., 250 at 20°C., and 145 at 40°C. The chloramines resemble the hypochlorites but they are much less active and also more expensive. The chlorine compounds are effective against all types of organisms except those of the acid-fast group.

Iodine.—Iodine, like chlorine, is a very valuable disinfectant. In the form of the official tincture of iodine, it approaches as nearly as any usable compound to being an efficient skin disinfectant. It is capable of killing all types of microbial life and penetrates the skin well. The controversy between the advocates of tincture of iodine and those of mercurochrome and similar preparations has been practically settled with a complete scientific victory for those favoring iodine.

Rodriguez found tincture of iodine to be very effective in disinfecting surgical areas in the oral cavity; even a combination of equal parts of the tincture of iodine and glycerin was effective, while in most instances, one part tincture of iodine, one part glycerin and two parts of 70% ethyl alcohol killed the organisms without undue irritation to the tissues. Be certain, however, that the alcohol used as a diluent for iodine is pure ethyl alcohol and not denatured with methyl alcohol which may be oxidized by the iodine to form very irritant compounds. The disinfection of contaminated wounds frequently is possible with tincture of iodine. Simmons (1933) made 151 wounds on rabbits and then contaminated them with *Staph. aureus.* When tincture of iodine was used as a disinfectant after contamination, he obtained sterility in 84% of the abrasions, in 83% of the superficial incisions and in 31% of the deep incisions. Iodine ointments, however, have proved a distinct disappointment.

Soaps.—Only too frequently, soaps are overlooked as skin disinfectants. All soaps possess some ability to kill microorganisms. The organisms which are not killed, are mechanically held in the lather and removed. Moreover, clean skin possesses remarkable powers of self-disinfection. As a general rule the hard water soaps, such as the cocoanut oil soaps, are superior to the so-called germicidal soaps which have been so popular during the last few years, but most of which are not any more effective than ordinary soaps. Because the surface tension of the soap is lower than that of the cresols which are added, the soap protects the organisms from contact with the cresol which is further inactivated by the very low concentration possible in a soap lather. The soaps which contain biniodide of mercury, either 1 or 2%, are actively germicidal against pus-producing staphylococci although they are much less effective against Gram-negative organisms. However, I seriously question the advisability of using a mercury soap over a period of years, as mercury is a slowly cumulative poison.

Ointments and Salves.—With the excep-

tion of the mercury ointments, these preparations have failed to show bactericidal action. Most of them are nice pharmalogical preparations with the active agent so compatible with the ointment base that there is little tendency for the germicidal principle to leave the ointment base and enter into combination with bacterial proteins. In fact, many of the so-called germicidal ointments contain living microorganisms. Recently Gershenfeld has experimented with ointments which have a cold-cream base and in which the disinfectant really is in a watery solution. These show considerable promise. Medicated oils likewise fail to exert a germicidal action.

When Is Disinfection Indicated?—After a critical review of the action of disinfectants upon microbial life and tissue cells, one must be cautious lest he become a therapeutic nihilist. I do not hold the gloomy view that disinfectants are without practical value or even that their application to the tissues is not justified. I do hold, however, that the indiscriminate application of disinfectant solutions to the tissues, especially those of the ocular and reproductive cavities, may be definitely harmful. Like every other weapon which is of value to medical science, the selection and application of germicides require a professional degree of knowledge and discrimination. I would no sooner wish to bar the scapel from the operating room, because in the hands of the unskillful it is a dangerous object, than I would advocate the discontinuance of the application of disinfectant agencies to the skin and tissues. Both the disinfectant and the scapel, even when skillfully used, cause some degree of traumatism or tissue destruction. Each may accomplish a very desirable objective. It would be equally absurd to allow a wound contaminated with the gas gangrene organism or a hemolytic streptococci to go untreated because an effective disinfectant destroys some tissue cells as it would to attempt to destroy, by the repeated application of strong germicides, the saprophytic staphylococci which are harmless residents of the normal skin or the lactobacilli which ordinarily reside in the female genital tract.

STANDARDS OF MEDICAL EDUCATION GROWING LAX

Deplorable conditions that prevailed in medical education thirty years ago again threaten this country, unless doctors, educators, state boards of examiners and public authorities combat present tendencies.

The American Medical Association issues this warning in the issue of its *Journal* for Aug. 31, 1935, along with the annual presentation of medical education data for the United States and Canada. Fifty pages are given over to this report of its council on medical education and hospitals.

Financial stringency in recent years has caused some medical schools to rely more largely on income from student fees. Thus, larger numbers of students have been accepted for the money they will bring in, the medical journal explains.

Unfortunately, in most instances the teaching staff has not been correspondingly strengthened or the physical plant commensurately enlarged, it is pointed out.

More alarming to the American Medical Association than undermanned faculties and overcrowded laboratories is the failure of some schools to maintain high academic standards in the selection of students. Too many applicants with poor scholastic records are being accepted, the *Journal* charges, with the inevitable impairment of school efficiency.

Thirty years ago there were 160 medical schools in the United States with an enrollment of 26,147 students. The American Medical Association sprang into action with its council on medical education. The Carnegie Foundation for the Advancement of Teaching helped out with its publicity. Ten years later the number of schools had been reduced to 96 and the enrollment to 14,891.

Now in 1935 there are again some 23,000 medical students. Medical schools still are fewer and better, but the factors that caused the deplorable conditions of a generation ago are again at work, a *Journal* editorial points out, and history is repeating itself. —*S. N. L.*, 38:752.

Differential Diagnosis of Swine Diseases*

By A. T. KINSLEY,
Kansas City, Missouri

IN DISCUSSING the differential diagnosis of some of the common diseases of swine, it seems advisable to consider some general principles and the variations of symptoms and lesions. It is not possible in some cases, in fact, in many cases, to make a positive clinical diagnosis. The simultaneous occurrence of two or more diseases increases the difficulty of specific diagnosis.

A knowledge of the cause and effect of basic pathological conditions, such as hemorrhages, edema, inflammation, etc., and the ability to recognize them is quite essential in arriving at a diagnosis. As an illustration, acute hemorrhagic septicemia is a typical septicemia characterized by petechiae in various tissues, but such petechiae may occur also in hog cholera and in streptococcic infection; therefore, it is not pathognomonic of hemorrhagic septicemia. Nor is petechiae of the kidney pathognomonic of cholera. The following suggestions are only relative, not absolute and positive.

Hog Cholera

In making a differential diagnosis of hog cholera, it is quite essential to have a complete, clearcut history. Characteristic, but by no means pathognomonic symptoms are: Temperature 106° to 108°F. Usually only two or three, or at most only a few hogs affected in the beginning. In the next few days, many will be sick.

The filterable virus of cholera robs the hog of its appetite. Affected animals will not eat. They hide in their beds. When driven from them, they knuckle as they walk. Practically all affected swine die.

As for lesions; there is frequently a blush, a congestion in different areas of the skin, but more particularly on the venter surface. Beneath the capsule of the lymph glands not infrequently a layer of blood resulting from hemorrhage will be found. That is, there is commonly a peripheral congestion of lymph glands. The lung, kidney, bladder and epiglottis may all or any of them show petechiae. There are cases of cholera in which there are no petechiae in the kidney, no petechiae in the bladder, nor in the lungs, nor in the epiglottis, but in other cases, there may be petechiae in two or more or all of these organs.

The bones frequently show some changes.

Hemorrhagic Septicemia

In hemorrhagic septicemia the temperature rarely exceeds 105°F. and only a small percentage of the herd is involved at any one time. It is not a mass infection nor a herd infection. Five per cent of the animals in the herd is usually about the maximum affected at a time. The appetite is diminished. They are rather select, and eat only a little. Not infrequently there is lameness. The joints are not enlarged. The lameness is like rheumatism rather than arthritis.

The lesions are characterized by widespread petechia, involving primarily all serous membranes. The kidneys not infrequently show it extensively. In some cases, particularly those that become sub-acute, an atypical catarrhal pneumonia with or without pleuritic adhesions will be found.

Some 20 years ago, through this section of the country, this type of hemorrhagic septicemia was very prevalent, and caused extensive losses, not so much owing to the number of hogs that died, but because of loss of condition and difficulty of finishing affected animals that apparently recovered.

Swine Influenza

This is an outstanding example of a herd infection. In the morning the hogs are well; by night 50% of the herd is sick with temperatures ranging up to 108°F. The out-

* Notes from an address at the annual meeting of the Indiana Veterinary Medical Association, Indianapolis, Jan. 21-23-1936.

standing symptom is a bronchial cough, a moist cough, similar to that of pulmonary stronglyosis; but differing in that there are no paroxysms of coughing. In pulmonary stronglyosis, the hog will cough and cough until it is exhausted and will fall to the ground. Not so in influenza, where the bronchial cough is a manifestation of involvement of the bronchial tubes. Thumps is more outstanding in this disease than in any other. The affected swine shrink very rapidly. In two or three days, affected animals look like they had lost 20 or 25% of their weight.

Pulmonary Edema

In pure, uncomplicated pulmonary edema there are no lesions except edema in the dependent parts of the lungs. It is a true edema, that is, an infiltration of edematous fluid into the air cells and intercellular tissue. If an affected lung is removed and sectioned, the serum will run out. The lung is so heavy it will sink in water.

Swine Erysipelas

The acute type of swine erysipelas is characterized by marked depression, temperatures of 105° to 107°F., and diminished appetite. They still eat. The onset is sudden and death prompt in the beginning. Usually the herd appears apparently normal and the first reaction of anything wrong is the finding of a dead hog. The ocular mucosa is congested and there is more or less suppuration and adhesion of the eyelids. There is edema of the eyelids, ears and possibly portions of the skin over the shoulders or elsewhere. The lymph glands are tumefied and edematous. In the early stages there may be slight hemorrhage here and there in the lymph glands, but ordinarily they are enlarged, juicy, edematous, not hemorrhagic.

Not infrequently there is gastritis and enteritis. In those cases in which there is gastritis, there will probably be vomition. There is a tendency to the "paint brush" hemorrhage on the serous coat of the stomach. The spleen is usually slightly enlarged.

The chronic type of swine erysipelas is manifested perhaps most frequently by the diamond skin lesion, which in the beginning is infiltrated and congested and becomes hemorrhagic. Those areas a little later have a tendency to slough. There will be lameness, lameness of the stilty type. Frequently some cases are seen in which vesicles appear on the skin. The affected swine have, practically, a normal appetite. There is erosion of the synovial membranes in this type of erysipelas and frequently accumulation of what appears to be a purulent material in the joints. There may be cauliflower growth or deposit of filbrin in the heart.

Enteritis

By enteritis, I refer to the type caused by the *B. suipestifer,* and it should be borne in mind that B. *suipestifer* infection may also result in septicemia. The everyday septicemic type of suipestifer infection is characterized by rapid onset, blue bellies, frequent urination and occasionally the urine is tinged with blood. The temperature ranges from 105° to 107°F. On autopsy, hemorrhages, usually larger than petechiae, are found. There is marked nephritis and a moderately enlarged spleen.

In acute enteritis, the appetite is impaired, but not in complete abeyance. There is diarrhea and marked depression. Necropsy will usually reveal marked enteritis of the acute type characterized in some cases by an escape of blood. In those cases that survive, the condition usually becomes chronic. This is the type characterized by the potbellied pig that has an abnormal appetite, apparently dries

up or shrivels up and looks like he will blow away. In that type of pig an organized exudate, and in some cases the "Welsh buttons" occur.

Summary

Of the outstanding symptoms and lesions in each of the foregoing diseases, one may say, briefly:

Cholera.—Only a few animals in a herd affected in the beginning, many later. Inappetence, high temperature, petechiae on kidneys, lungs, epiglottis, any of the tissues of the body. In very acute cholera, the first few that die may show no gross lesions. Mortality nearly 100%.

Hemorrhagic Septicemia. — Small percentage of herd infected at any one time; not rapidly fatal, and the principal lesion is hemorrhage, petechial hemorrhages. Mortality usually rather low.

Influenza.—The outstanding symptom in "flu" is the severe bronchial cough and the mass or herd infection. With proper care mortality is almost nil but under unfavorable conditions it may be serious. The loss of condition is marked.

Pulmonary Edema.—Clinically this disease resembles a toxemia. Only a few animals in the herd infected at a time. They shrink rapidly. The chief symptom is dispnea. Practically the only lesion is edema of the lungs.

Acute Erysipelas.—Sudden onset, diminished appetite, stilty gait. Prompt recovery when given serum.

Chronic Erysipelas.—The ears, eyes, tail or a foot and patches of skin may slough.

FATAL INTERNAL HEMORRHAGE IN A HORSE

I was called about midnight to see a horse that the owner stated was breathing heavily, and that the ailment had come on suddenly about five hours previously.

I found the horse standing, apparently in not very much pain; pulse was weak and intermittent; all mucous membranes pale; the skin and extremities cold; breathing very labored and short. There was some bleeding from the nostrils and a temperature of 106°F.

My diagnosis was internal hemorrhage and prognosis death within, at most, a few hours. In about ten minutes after my arrival, the horse stretched as if to urinate and passed about a half gallon of blood. This phenomenon was repeated every 10 to 15 minutes for six hours, when the animal dropped dead without a struggle. No autopsy was held.

There was no history of a previous ailment. I shall appreciate suggestions as to what pathological condition may have been responsible for these symptoms and the death of the animal.—*J. A.*

COMMENT: It would appear this animal was suffering from shock. As to whether the shock was due mainly to internal hemorrhage could have been decided only by necropsy. From the description, we should say that it was not blood, but urine mixed with blood that was passed from the bladder. Blood from a severe hemorrhage into the bladder clots promptly and is not passed via the urtehra. Unquestionably there was hemorrhage into the bladder and from the Schneiderian membrane, indicating a generalized condition that would not ordinarily be expected in simple internal hemorrhage. Perhaps a generalized carcinomatous condition that rather suddenly involved a vital part is as good a guess as

The importance of holding autopsies on cases that are lost cannot be too strongly emphasized where there is any question as to the diagnosis. It affords protection and information for the veterinarian and satisfaction for the owner.

A Bovine Dermatitis*

By E. J. FRICK, Manhattan, Kansas
Division of Veterinary Medicine, Kansas State College.

In the spring of 1935, there occurred among Kansas cattle, numerous outbreaks of an ailment that, in the absence of a more specific name, may be designated simply dermatitis. Ergotism, urticaria, kicking disease, wheat poisoning and other names have also been applied to this condition. Perhaps a nutritional deficiency ultimately will be found to be the cause. Whether the disease will be with us again this year or whether we must wait for another prolonged drouth before we encounter it again, is at present unpredictable with any certainty.

This disturbance first came to our attention April 3, 1935, when Dr. E. R. Frank was called to see some dairy cows near Manhattan suffering from a skin condition he called urticaria. On April 5, I visited a herd of 28 grade Herefords near Randolph and made a diagnosis of malnutrition. April 11, Dr. Gordon Danks investigated an outbreak at Silver Lake in a herd of 180 feeder cattle and called it deficiency disease. April 12, 22, 25, 29, May 1, 5, 6, and 7 represent dates on which we were called to investigate this same condition in other herds. Numerous other cases were brought to our clinic. The condition was not local. We heard of many cases among the cattle of our clients' neighbors. Reports were received of similar outbreaks near Hays, Clay Center and Waterville, Kansas.

The history on all outbreaks, so far as we were able to obtain it, was that the cattle in every instance had been on green wheat pasture during the fall, winter and spring months. This prolonged period of pasturing was a necessity for most livestock in the sections concerned, because of the shortage of other feed resulting from the severe drouth of 1934. Some of these herds had supplementary corn fodder, stalk fields, sudan grass, or alfalfa; and some dairy cattle had small grain supplements. All classes of cattle were involved, except calves under six months of age. In the average herd, the heavy milk producers were the first attacked. Although the clinical syndrome varied, it usually developed as follows:

A cow would be noticed to be nervous; kicking repeatedly at her udder or stamping her hind feet. Constant switching of the tail was commonly an early symptom. A blistered appearance around the muzzle usually developed, and was followed by salivation and drooling with marked inappetence. The tongue and buccal membranes would shred off. The conjunctivae also appeared blistered. The ears showed evidence of blistering in many cases; the hair falling out around the margins. Some tails sloughed off completely and a considerable number lost all the brush. The teats and udder would develop hard, dark brown or black scabs having the appearance of leather. The milk flow usually ceased entirely in a few days after the onset. The temperature usually was elevated but slightly, 104°F. Respirations and pulse were slightly quickened. A few cases developed large areas of slough covering most of the back. Only two animals evidenced marked laminitis. Strange to relate, no mortalities occurred and no autopsies of typical cases could be made.

Bacteriological findings were negative. Blood analyses on most of these herds showed an exceptionally low calcium and phosphorus content. Normal phosphorus, being 6 to 9mg. per 100cc, ranged from 1.8 to 4mg. The calcium normal of 10 to 12mg. per 100cc dropped to seven; but, checking on other herds, it was found that some cattle not showing symptoms of dermatitis were also low in phosphorus and calcium. Not knowing the cause, treatment could be symptomatic only. Intravenous injections of 300 to 500cc of 20% calcium gluconate solution relieved the nervous symptoms in a few minutes. It also raised the phosphorus level in about four hours, but the calcium level stayed down for a much longer period.

Economically, this condition is important

* Presented at the Annual Meeting of the Kansas Veterinary Medical Association, Manhattan, Jan. 14-15, 1936.

as it causes marked losses in flesh and in milk production. Affected animals, for the most part, entirely recovered their health. The disease disappeared almost as suddenly

Cow Showing Lesions of Dermatitis

as it appeared. We attribute the disappearance to access to grass pasture which became available soon after the outbreak occurred, but we do not know definitely that such is the case.

FATALITIES FROM SITFASTS

I should like some information on the treatment of sitfasts on the top of the withers from a collar bruise.

I have had several cases that have become gangrenous and the animals have died. I have tried operating, removing the sitfast and establishing drainage on the sides of the neck, with no benefit. The last case was a mule, seven-years-old, in good working condition. The sitfast had not begun to suppurate, but had turned black and was insensitive to the knife. I removed all the core, or as much as possible and administered an intravenous injection of 125cc of hydrochloric acid, 1 to 1500. The mule died the following night. I also packed the cavity with salicylic acid, and had the parts bathed in hot lysol solution.

Any information that will assist me in saving these good animals will be greatly appreciated.—K. K.

REPLY: In the matter of grave sitfasts of the collar seat, the important thing is to prevent them by means of a collar that fits and sensible practices in backing and turning in harness.

In bad cases, it is never advisable to be too hasty in operating. It is much better to rest the victim and subject the neck to a good antiseptic treatment while the acute phase of the inflammatory process beneath subsides. The fatalities you have had were evidently due to neglect on the part of the owner in not taking the mules out of harness sooner and also to your too free intervention at an inopportune time.

To operate, clip, shave and thoroughly cleanse the site and surroundings; use wet packs, preferably biniodide of mercury, about 1 to 500; then, when a definite line of demarcation becomes visible, the necrotic center may be removed, all the time taking care not to transgress needlessly into the viable flesh. In some instances the necrotic area is quite deep, running into the neck ligament. Such a case is notorious for the propagation of anaerobes (gas, gangrene, malignant edema, etc.). In our experience, when such conditions are present, surgery only does harm by spreading the trouble into the surrounding muscles. In the shallow sitfast of this type, lateral drainage is not necessary and in the deep cases, lateral incisions are of doubtful value after operating. It is much better to treat the "well" from above, with irrigations and abundance of a good antiseptic powder.—L. A. M.

MARGARINE TAX PROPOSALS

Numerous dairy and farm groups have recently passed resolutions in favor of placing additional taxes and other restrictions on manufacture and sale of margarine. Among groups proposing a federal tax of 5 cents per pound on margarine are American Farm Bureau Federation, National Dairy Union and American Association of Creamery Butter Manufacturers. It is reported that these proposals indicate Congress is to be asked to take some kind of restrictive action toward margarine during the present session.

Post Vaccination Losses Of Swine*

By A. T. KINSLEY,
Kansas City, Missouri

Handling post vaccination losses in swine practically always involves differential diagnosis as a starting point. The first question to answer when confronted with an outbreak of disease in a herd that has been vaccinated recently is, "Is it hog cholera?"

Swine can be immunized against cholera, provided they are healthy and proper age when vaccinated; and, provided further, that the virus is virulent and the serum potent and proper dosage of each is given. And provided still further, the vaccination is performed properly and that the herd has proper after care. I am so old-fashioned as to doubt life immunity can be produced universally in pigs less than 10 days old. I would set the youngest limit for vaccination at about 10 days before weaning.

I hope we have passed the time when we had competitors rather than associates in veterinary practice, and men were going around bidding on vaccination at a low figure where they were almost compelled to use minimum doses of serum. We had more trouble when we had that kind of competition than now, when the veterinarian gives the right dosage of serum and virus.

I do not believe it advisable to vaccinate a bunch of suckling pigs and wean them immediately; neither do I believe it advisable to vaccinate a lot of shotes and throw them over the fence and let them hog down corn. Better results will be obtained if they are fed a diminished amount of a commonsense ration until the virus reaction has passed.

THE immunity produced with serum and virus is an artificial immunity. It is not absolute. Artificial immunity can be broken down and a hog, after it has been immune, can be rendered susceptible again to cholera. I don't think this occurs in herd units, but it does occur in individual hogs and is sometimes rather embarrassing to the veterinarian. The owner should be apprised of the fact that under *ordinary circumstances* his hogs will be immune to cholera after vaccination. Do *not* make the absolute statement that all of them will be immune for life for mayhap they won't be.

Again, swine have diseases other than cholera. Twenty-five years ago to say this was to be laughed at. During the virus reaction period, in a hog, there is a leucopenia or a diminished number of leucocytes in a hog's blood. In other words, during the virus reaction period that hog becomes more susceptible to other diseases, such as streptococcic infection, suipestifer infection, hemorrhagic septicemia, enteritis, edema, "flu" and what not. They become more susceptible because of the diminished leucocytes, diminished warriors in the body. Leucopenia is a very significant factor. It necessitates extra care after vaccination.

SWINE may die after vaccination. Why shouldn't they? There are so many diseases rampant that there is all the opportunity in the world for them to die. A calf immunized against blackleg may die of some other disease. There is nothing about the hog cholera vaccination that insures against everything else, and yet if anything on earth happens to that herd of hogs that have been vaccinated even two or six weeks after, or six months, it is quite customary for the veterinarian to go out and assume all responsibility. Why should he? It is the custom. Why did it ever start, and why is it continued? It convinces the farmer that the veterinarian is not certain that he protected those hogs. It arouses the suspicion that possibly a snide serum was used or something was neglected. The attitude is that by vaccinating a hog the veterinarian insures its life against everything, including lightning stroke, yet he is not compensated for insurance. If he is going to run an insurance business along with

* Notes from an address at annual meeting of the Indiana Veterinary Medical Association, Indianapolis, Jan. 21, 22, 23, 1936.

his vaccination, he should get paid for it.

Swine may die after vaccination and they do. Serum and virus from responsible firms are much more constant than is the condition of hogs in the hog lot. Ninety-nine times in a hundred blame placed on the serum or virus is wrongly placed.

To repeat: First, swine can be immunized, and second, swine have other diseases than cholera; and third, we know swine die after vaccination. Who is responsible in these post-vaccination losses? There are three parties concerned. First, the practitioner; second, the serum producer, and third, the hog owner. If the practitioner makes a careful observation of the herd of shotes that are to be vaccinated and finds them healthy and loss occurs later, he is not responsible. If the practitioner does not ascertain the condition of swine before vaccination and there are losses, he is responsible.

Second, the serum producer. Serum and virus manufactured in licensed plants are supervised in production and tested, and if found wanting are not sold. Some brands of serum are better than others, but all are good. It must be conceded the licensed serum company has practically no responsibility.

Third, the hog owner. If the farmer hasn't followed the veterinarian's advice in the care of his hogs after vaccination, he is responsible. If he hasn't done all the things he should do, he is the responsible individual, but too often in the past the veterinarian has assumed that responsibility. There is no occasion for it whatsoever.

I wish to propound three questions:

1. Will an excessive dose of serum and the regular dose of virus produce the same degree of immunity that will be produced by a regular dose of serum and virus? In other words, can you give too much serum to produce a good solid acquired immunity?

2. Is it possible to produce a permanent immunity by the use of serum and virus in suckling pigs from immune sows, and in non-immune hogs that had been injected with serum ten days previously?

3. Do hogs that are treated with serum and virus in public stock yards withstand hyperimmunization better than country vaccinated hogs? If so, why?

* * * *

SALT-PROTEIN POISONING IN THE DOG

Recently I had as a patient a dog that had eaten some heavily-salted, recently-slaughtered pork. The animal developed general paralysis 24 hours after eating the pork and died shortly. I was unable to hold an autopsy, but there was nothing else in the obtainable history to account for the ailment. I find nothing in my textbooks concerning sodium chloride poisoning in the dog. I should like some information on the subject.—*G. F.*

COMMENT: Veterinary literature seems barren in the matter of the effect of common salt on the dog. Reasoning from its effect in swine, one might conclude it is not harmful, at least not fatal in any quantity that is likely to be consumed voluntarily. Further, some veterinarians habitually use salt as an emetic in the dog and have so used it in a large number of cases without causing the slightest apparent harm to the animals.

Emesis in swine is caused readily by eating salt. No further harm appears to result. Experimentally, swine have been fed salt in considerable quantities, just under the amount required to produce vomition, for a long period without harming them. There appears to be no record of a hog being killed by salt. If the quantity consumed is large, it is ejected; if less, it is tolerated. Swine, however, are readily poisoned by combinations or mixtures of salt and certain proteins, thus there have been many cases of poisoning from drinking brine from meat. Likewise, from various slops. In the latter instances, however, the harm is probably done by soaps or alkalis contained in the slops. In the present case, we should attribute the fatality to the salt *and* the meat rather than to either.

Mastitis from the Manufacturers' and Distributors' Viewpoint *

By F. B. HADLEY,
Madison, Wisconsin

DAIRY manufacturers and milk distributors appreciate the economic importance of mastitis. This is also true of producers and consumers of milk. Each has a somewhat different interest, but that of the producer is probably the greatest, because mastitis affects not only the quality of the milk but also the production of the cow. Consequently the producer should be the easiest to interest in the control of this very prevalent disease of the cow's udder.

Possibly the best way to introduce the subject is to state a few commonly asked practical questions such as the following: What tests are most reliable for detecting mastitis milk? To what extent must the composition of milk be changed before it becomes unfit for manufacturing purposes? How much evidence of mastitis must be present before the milk becomes unfit for consumption? Does a slight increase in the number of streptococci and leucocytes justify condemning milk?

Mastitis Tests

Alkalinity Tests.—As indicators are used quite extensively to test milk for mastitis, they will be considered first. The two indicators most commonly employed for this purpose are brom thymol blue and brom cresol purple. A well-marked degree of reaction is shown by a decided color change, which signifies, as a rule, that the milk is either less acid or distinctly alkaline in reaction, that is, has a higher pH than normal milk. Such a reaction justifies making a tentative diagnosis of mastitis. If the milk also has a bad odor and taste and/or is abnormal in color or consistency, it should not be used. A less distinct color change is often shown with milk from mild or chronic cases of mastitis, as well as with that drawn at the beginning and toward the end of the lactation period.

An excess of free ammonia in the stable air may influence the test if papers impregnated with the indicator are used. In such premises the tester may be unable to evaluate the reaction accurately. These limitations should always be kept in mind when using an indicator. If they are not, the tester is likely to put a wrong interpretation on his results and give the producer misleading instead of helpful advice.

Even though these commonly employed indicators have limitations when used to detect mastitis, it should not be inferred that they are not helpful. As a matter of fact, even though we know that the results secured from their use may be unreliable, we still consider them of value. They should not be relied upon entirely.

Other Rapid Tests. — Experience has taught that no one test is accurate; hence results by any single method should be confirmed by some other method, such for instance as the rapid chlorine test and the strip-cup, plate, or sediment tests. Physical examination of the udder is also helpful in establishing the diagnosis beyond question.

Reductase Test.—The methylene blue test is used in the dairy industry to grade milk for keeping quality. It is based on the fact that living bacteria absorb oxygen and gradually reduce the oxidation-reduction potential of their environment, thus causing the color to disappear at a rate depending largely upon the number of bacteria in the milk. From experiments designed to learn whether this test can be employed to test milk for mastitis, it was found that the greatly increased number of viable leucocytes in fresh mastitis milk reduced this dye so rapidly as to make the results unreliable. After the leucocytes die, as they do within a few hours, they no longer are able to absorb oxygen, so milk from a mastitic udder if tested soon after it is drawn

*Published with the permission of the Director of the Wisconsin Agricultural Experiment Station.

may give a more decided reaction than does the same milk after it has been kept cool for several hours.

Str. Epidemicus Test.—Until quite recently it was believed that the streptococcus which causes septic sore throat in man (*Str. epidemicus*) was identical with a streptococcus which sometimes is responsible for mastitis (*Str. zooepidemicus*). Within the past two years studies have shown that these are two distinct types of organisms. Both are capable of causing mastitis, but the one which is occasionally found in the cow's udder probably is not injurious to man. This observation will do much to take the curse off a milk supply in which a streptococcus of the bovine epidemicus type has been found, as such milk presumably is not capable of transmitting disease to man and causes no harm, even when consumed in very large quantities. The sorbitol-trehalose test is used to distinguish between these two types of beta hemolytic streptococci. When the human type is demonstrated a milk-borne epidemic of septic sore throat may occur from the use of the raw milk. Fortunately the human type is seldom found, but when it is the public health authority should be immediately notified, the milk discarded, and an attempt made to determine whether the organisms came from the udder of a cow infected by a milker, or by direct contamination of the milk by an employe who has or has had septic sore throat.

Microscopic Test.—In some city milk plants routine laboratory examinations for mastitis are made on every can of milk. These consist either of a microscopic study of smears made from the milk after it has been incubated over night at 37° C. for streptococci and leucocytes, or of the gravity cream. Often a cultural examination for total bacteria, i. e., a plate count, is also made. When the counts for both of these forms are found to be high and other tests are positive, mastitis may be suspected. The report of the intake inspector is also of value in this regard, but cannot be relied upon entirely any more than can a report based on but one method of examination to the exclusion of all others. In other words, the greater the number of methods employed the better will be the judgment of the tester.

Clinical Inspection.—When the laboratory examination indicates that mastitis may be responsible for the poor quality of a supply, a field inspector is sent to the farm to aid the producer in determining the source of trouble. This man should be a graduate veterinarian, as his duties consist of diagnosing disease and outlining measures for its control. He will make a herd survey for mastitis by applying at least one of the rapid diagnostic tests to the first drawn milk from each quarter of every cow in the herd. If confirmation is desired, some of the other barn tests already mentioned may be used, and suspicious samples taken to the laboratory for examination by more accurate methods. This procedure eliminates the possibility of error and establishes the diagnosis beyond reasonable doubt.

Initiating Mastitis Control

Any program for mastitis control planned to include all herds supplying milk to a plant should be studied carefully before it is put in operation. The details should be gone over with a man who has had experience in this work; otherwise the plant manager is likely to get into difficulties even though he starts with the best of intentions. Furthermore, the proposition must enlist the full cooperation of the producers. This can be secured only by a campaign of education. As an aid in holding producer interest and to show him what progress he is making, a report card indicating the grade of his product from time to time has proved of much value. (See illustration.)

Dairy farmers should understand that eventually the manufacturers of evaporated milk and of cheese will be forced to refuse milk from herds in which much mastitis exists. When that time comes those producers who have made an effort to reduce mastitis in their herds to a minimum will have a decided marketing advantage. Farmers producing milk for fluid consumption should be impressed with the fact that they must exclude milk from diseased quarters in or-

der to hold their market. This is usually a sufficient threat to enlist their interest and cooperation in a mastitis control program. However, until such time as the farmer is offered some real encouragement, it is doubtful if his whole-hearted cooperation can be enlisted. It has been suggested that the best way to secure this and thus improve the quality of the supply, is by paying a premium for quality milk.

Mastitis Eradication Impractical

At one time we believed it would be possible for many farmers to establish mastitis-free herds. After trials in several herds it is concluded that under ordinary dairy farm conditions this is a practical impossibility. Accordingly we are suggesting that an attempt be made to maintain herds reasonably free from mastitis rather than to try to eradicate the disease. Some progress can be made in this direction by disposing of all cows with noticeably diseased quarters, and by the segregation of those with less marked evidence at the end of the milking line; but unless supported by other hygienic measures, culling and segregation will be unsuccessful in preventing and controlling mastitis in most herds.

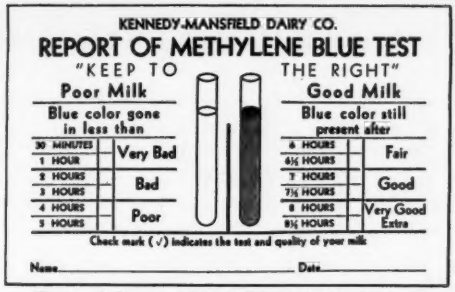
THE DOG INDUSTRY PROSPERING

Exactly 8,000 dogs were registered with the American Kennel club during January of this year to establish a new all-time record for registrations during a single month. This figure is significant, according to the club, because it means that more dogs were registered in this one month than during the first ten years that the registry was maintained.

The previous record for a single month was made in October of 1935, when 7,025 dogs were registered. During January 56 of the 103 recognized breeds either showed advances or maintained positions reached in the same month last year.

The hound group made the greatest gain, going from 517 in January of 1935 to 1,544 during the first month of 1936. The sporting dogs went up from 1,157 to 1,544, terriers from 1,846 to 1,876, toys from 630 to 678, and the working group from 514 to 587. The only drop was in the nonsporting group—from 1,586 to 1,577.

Greyhounds, cocker spaniels, and Scottish terriers showed the biggest increases in January of 1936 over the same month in 1935. Greyhound registrations jumped from 7 to 1,186, mainly because owners of racing dogs are being required to register their dogs with the A. K. C. in order to be allowed to race on most tracks. Cockers went from 683 to 922 and Scotties from 690 to 740.—*Bob Becker.*


KENNEDY-MANSFIELD DAIRY CO.

REPORT OF METHYLENE BLUE TEST

"KEEP TO THE RIGHT"

Poor Milk — Blue color gone in less than		Good Milk — Blue color still present after	
30 MINUTES	Very Bad	6 HOURS	Fair
1 HOUR		6½ HOURS	
2 HOURS	Bad	7 HOURS	Good
3 HOURS		7½ HOURS	
4 HOURS	Poor	8 HOURS	Very Good Extra
5 HOURS		8½ HOURS	

Check mark (√) indicates the test and quality of your milk

Name_____ Date_____

Type of Report Blank Sent Producers of Unsatisfactory Milk

BETTER FARM ANIMALS—OR JUST MORE PUREBREDS?

Livestock breeding in the United States may be—genetically speaking—at the crossroads. It may continue simply to increase the number of purebreds, or it may turn sharply toward improving the breeds themselves. A survey by the Department of Agriculture shows animal breeding has not kept pace with plant breeding in developing and perpetuating superior germ plasm.

The reasons are apparent. An animal is a more complex organism than a plant. With larger animals reproduction is much less rapid than with plants. The geneticist works with much smaller numbers. Effects of environment are difficult to separate from effects of inheritance. And self-fertilization, which simplifies breeding of improved plants, is out of the picture with animals. The difficulties are real, but, many scientists believe, not insurmountable.

There already are practical "yard-sticks" for measuring production, such as milk records for dairy cows, speed records for horses, and egg records for hens. Methods of determining quality and quantity of production in meat animals are less definite and need improvement. This branch of research is receiving constant attention by the United States Department of Agriculture.

Asthenia of the Stifle in Horses

CONGENITAL asthenia of the stifle resulting in a hither and yon slipping of the patella from its pulley is not included in this discussion. We coin the name to replace "luxation of the patella," "pseudo-luxation of the patella," and "stifle cramp," names consecrated by usage since time out of mind to designate a common locomotory ailment of the adolescent or adult horse characterized by sudden inability to move. It is strange how many ailments of the horse remain in the misunderstood column from lack of attention to their precise nature. Asthenia of the stifle is one of these.

The change of name from "luxation" to "pseudo-luxation" came about when a bit of common sense was injected among the traditional superstitions of equine medicine during the last decades of the 19th century; *c'est-a-dire,* when it was realized that a real dislocation of an erstwhile normal articulation, is an affair of some consequence, accomplished only by stretching binding and synovial ligaments and otherwise traumatizing the ensemble of a highly complex diarthrosis, and, needless to add, would be followed by considerable inflammatory reaction. By no twist of the imagination could such a complex as the femero-patellar articulation be dislocated and suddenly snap back into place without leaving a trace of damage. So, the wise hippodoctors changed the name to "pseudo-luxation," whatever that means. Just how a luxation could be false was not included in the new hypothesis.

Then, supposedly wiser minds shifted the name to "stifle cramp." To them the trouble was a spasm of the related masculature or a part thereof. Although this name held sway for a generation or more, its *rationale* could always be "shot full of holes." The anatomy of the phenomenon was explained as a riding or hooking of the patella upon or nearly over the medial lip of the femoral trochlea. Strangely, this idea went practically uncontradicted, irrational as it was. The more thoughtful wondered how powerful muscles all pulling laterally could possibly deviate the patella in the opposite direction. Although medicine never lacked far-fetched theories in any event, this one, in the manner of speaking, didn't make much sense. The cramp theory, however, was venerated as a matter of course for at least the four decades preceding this very hour, even though a cramping of no related muscle or group of muscles could by any means bring about a luxation of the patella and femoral trochlea. A cramp about the stifle might draw the patella laterally or proximally but not medially. Moreover, so far as riding or hooking upon the medial lip is concerned, the higher the patella is drawn, the deeper and more secure is its implantation in the trochlea. The medial lip becomes larger and the groove deeper in the proximal direction. The harder a muscle pulls it the less would be the danger of a dislocation.

Williams (W. L.), who has a flair for getting at the bottom of things pathologic, sensing the irrelevance of blaming the triceps which could do nothing but pull the patella outward, located the trouble in the ischio-tibial group, although the action of these muscles upon the stifle is indeed remote. Just how the gracilis, for example, could by any genre of gymnastic performance lift the patella from its emplacement in the deep trochlea, up and upon the medial flange was not included in explaining the ischio-tibial theory. Vetal thought the cramp affected all the muscles of the thigh and Violet thought the cramp was isolated in medial vastus. All along the chain of debates there was interspersed attempts to make the cramp theory seem a bit less ridiculous. The wary watched on.

E. Merillat, professor of physiology in the Chicago Veterinary College, who was once called "The Missouri philosopher" because nothing with him was ever taken as a matter of course, could see nothing but prostration of the thigh muscles as the

cause of the phenomena. He named the trouble "stifle prostration." Sendrail (1935) of Toulouse confirms this reasoning, after having shown that the trouble is fixation of the patella in its proper groove by prostration of all the muscles of the region concerned in supporting weight and thus leaving the vasti muscles, not weight supporting, unchecked in their pulling action upon the strong fascia enveloping this articulation superficially. The patella is fixed in, not out of, the trochlea, as everyone who ever made a careful physical examination of the joint of an affected subject will agree. No one ever found the patella out of place. In fact, palpations and manipulations of this prominent place never furnish any evidence of dislocation, whatsoever.

EVERYONE who has practiced among horses will recall the typical picture of asthenia of the stifle, which has been so insistently called luxation. The young horse too rapidly trained, the overworked draft horse, the fatigued and convalescent but otherwise normal horse is suddenly found literally stuck to the floor, unable to move forward or backward. It was common to say "the leg was nailed to the floor." Stepped forward or backward within the range of the leg's length, the foot stayed fixed to the spot occupied until the victim was whipped forward or backward whereupon the affected leg trailed behind full length as if every joint were ossified. Often, another clack of the whip brought the leg into normal action as if nothing had happened; and nothing more happened if the horse was kept walking for a quarter of an hour or so. If stopped too soon the trouble would relapse and require another snap of the whip to set matters right again. Another successful and a more elegant method of treating this fixedness of the leg is to execute a rude massage of the patella with the hands, pressing hard especially inward, until a sort of thud brings the joint into action. Quick exercise prevents recurrence.

The name "asthenia of the stifle" is defended on the ground that it is the only one the present writer can conceive that indicates the actual pathology of this much misunderstood equine affection. A fault of the nomenclature is that it is the motivating apparatus of the joint and not the stifle *per se* that is asthenic—weak. As Sendrail and Armingaud have recently pointed out, the nerves of the triceps and vasti are prostrated and leave the patella locked in, not out of, the trochlea.

The cure is simply that of re-exciting the dormant reflexes of the tired stifle muscles.

L. A. MERILLAT,
Haver-Glover Laboratories.
Chicago, Ill.

BOT CONTROL IN NEW ZEALAND

In this corner of the world, bot fly campaigns are carried on exclusively with carbon disulphide in liquid form. I note that in the United States, both the liquid and dry mass capsules are used. In this country, we follow the administration of the carbon disulphide with a cathartic. I do not see that mentioned in this treatment in the United States.

Each winter I treat from 2500 to 3500 horses for the elimination of bots. All together, I have treated thousands of animals with liquid carbon disulphide. I find the best results are obtained by fasting the animals not less than 16 hours or more than 20 hours. I also withhold feed and water for two hours after treatment, and then give the water first. If practical, I prefer the first feed to be a mash.

I should not want to dispense with the active cathartic after giving the bot treatment, or rather as a part of the treatment. The effect on the owner of the expulsion of large numbers of bot is tremendous and keeps up his interest in having his horses treated.

My cathartic of choice is "Isten," a German (Bayer's) product. It has no taste nor smell and is readily taken in the first feed, if the feed be not too liberal in amount. The foregoing treatment removes 95% of the bots, but we like to get 100% and we do this by repeating the treatment after 24 hours. That is to say, after the first treatment the horse is fed for 24 hours, again

fasted for 16 hours and given a second treatment. This removes every bot larva.

I should like to know what is meant by the dry mass capsule and how it compares in efficiency with carbon disulphide.—*S. B. V. S.*, New Zealand.

COMMENT: Dry mass capsules are merely capsules containing magnesium carbonate in which has been incorporated a dose of carbon disulphide.

The advantages of dry mass over the liquid preparation probably consists in less danger of suffocating the animal following "accidents" in administering the capsules, and possibly also in occasioning less severe gastritis than does the liquid. However, the gastritis produced by liquid carbon disulphide is evanescent — ephemeral — in character and probably does not harm other than to interfere somewhat with the appetite for a few hours.

As for the use of an active purgative after giving carbon disulphide, results indicate that it does not contribute to the effectiveness of the remedy and on the theory that the less punishment given the animal the better, is contraindicated.

If he has had experience, a demonstration of the bots should not be necessary to convince the owner of the desirability of having his horses treated for the removal of bots, the performance of treated horses in the harness is all that is necessary.

EFFECT OF FLOODS ON ANIMAL MORBIDITY

Much has appeared in the daily press about the possible after-effects of the floods on the health of the people. Nothing has yet appeared, so far as I know, about the possible after-effects of the floods on the health of livestock.

As yet I have had no opportunity of checking this matter over carefully with our Bureau of Animal Industry but it seems to me probable that over the flooded areas the health of animals may be endangered in several ways. Their drinking water may be polluted and there may be deposited on the grasses of the lowland pastures substances which may possibly lead either to certain types of digestive or other disease, parasitic infection or, in a few cases, to certain types of poisoning.

It would be appreciated if the veterinarians would report to the Secretary of Agriculture (or to Dr. John R. Mohler, Chief of the Bureau of Animal Industry) cases of disease or disturbances in health which they believe trace to the after-effects of the flood.—*Henry A. Wallace.*

SCHOENING NEW ASSISTANT CHIEF OF B. A. I.

Appointment of Dr. Harry W. Schoening, chief of the Pathological Division of the Bureau of Animal Industry, as an assistant chief of the Bureau, is announced by the U. S. Department of Agriculture. Doctor Schoening will continue as chief of the Pathological Division, but will devote time also to administrative duties dealing with general Bureau research in livestock diseases. Dr. A. W. Miller, the other assistant chief of the Bureau, is in charge of administering the Packers and Stockyards Act.

Schoening was named chief of the Pathological Division in 1932 to fill the vacancy created by the death of his predecessor, Dr. J. S. Buckley. After receiving the V. M. D. degree from the University of Pennsylvania in 1907, Doctor Schoening joined the Meat Inspection Division of the Bureau. Five years later he was transferred to the Pathological Division. He was a member of the Federal Commission of three scientists which in 1925 and 1926 studied foot-and-mouth disease in Europe. He holds a commission as a major in the Army Veterinary Reserve Corps. He also is a member of the A. V. M. A., the Society of American Bacteriologists, the National Association of B. A. I. veterinarians, the Academy of Science and the Cosmos Club of Washington, D. C.

Maurice C. Hall is the author of a recent article in the *Journal of Parasitology* (August, 1935) giving his views on the controversy as to the amount of credit due D. E. Salmon, Fred L. Kilborne, Cooper Curtice and Theobald Smith for the discovery of the rôle of the fever tick in the transmission of Texas fever in cattle. It is Doctor Hall's opinion that much credit is due each of the four scientists named and to a number of others, and that certain popular literature which accords most of the credit to Smith, is not in accordance with the record.

Ringworm Infection of Cats

By GEORGE W. RAWSON,
Detroit, Michigan

AS VERY little seems to have been published in American veterinary literature about ringworm infection in cats, the writer is prompted to offer the results of his own rather limited experience, hoping that it may be of interest, as well as of some practical value.

My attention was first directed to microsporon, or ringworm infection in cats, by a neighbor asking me to examine his white Persian kitten, which he had recently purchased from a pet shop in Detroit. The tail of this kitten had many scabs which at first I thought were due to scabies. However, after microscopic examination of scrapings, I could not discover any mange mites, so was at a loss to account for the kitten's condition. Several days later my own kitten (which had occasionally been in contact with the neighbor's kitten) also developed a few small scabs on various parts of its body, which soon became more numerous, particularly on the neck, back and sides. Having an adult cat also, I thought it would be advisable to make an examination, and as I suspected, I found a few small scabs on the back of the ears and on the sides of the neck. Following this, more determined effort was made to ascertain the cause. Suspecting fungus infection, scrapings containing scales and hair were submitted to a competent and experienced mycologist, who kindly made a culture of this material and succeeded in isolating a fungus which was identified as *Microsporon felineum.*

Etiology

According to Jacobson,[1] the fungus causing ringworm in man and animals (Dermatomycosis) consists of two distinct varieties. The human type, *Microsporon andouini,* which does not readily affect animals, and the animal type, *Microsporon lanosum,* which affects animals such as cats, dogs, horses, guinea pigs, and also man. *Microsporon felineum* is considered by some authorities to be an aberrant form or variety of the animal type, while others consider it to be synonymous. Guinea pigs are very susceptible to infection, consequently, they are very useful for laboratory purposes as they can be inoculated readily by scarifying the skin of the back. The human type of microsporon is very similar to the animal type and the two can be differentiated only by cultural characteristics. However, this is a matter which is of interest only to the specialist in pathogenic mycology.

Symptomatology

The lesions produced by *M. felineum* in cats, according to my own observations (limited to eight cases), are small, more or less rounded, raised scaly or scabby areas on almost any part of the body covered by hair. The parts most often affected are the ears, face, neck, back, sides of the body, tail, legs and paws. The scaly or scabby areas do not seem to cause any appreciable irritation in cats, at least in comparatively mild cases, neither do they appear to produce any systemic effect or toxemia. The hair is not shed on or surrounding the affected parts. If the scaly or scabby areas are small and on parts of the body covered by hair, it is usually necessary to locate them by sense of touch, particularly in Persians or other long-haired cats. I have reason to believe that infection is to some extent self-limited, because after treatment is commenced and the old lesions are more or less under control, new ones do not seem to form very readily, and after a time the patient seems to recover spontaneously. Whether the disease would disappear without treatment is, of course, questionable. At any rate, if immunity is developed, it is apparently of a temporary nature only, as I understand that animals (particularly laboratory animals) can be repeatedly reinfected.

Because of the comparatively benign nature of ringworm infection in some cats, the

owner may not notice anything wrong with his animal until the scabby areas become quite numerous or coalesce, forming comparatively large, scabby patches. Mild cases of infection may be erroneously attributed to "skin trouble" due to dietary disturbance, or in more advanced cases to sarcoptic mange. A microscopical examination should be made after soaking scrapings from the affected areas in a ten per cent solution of sodium hydroxide. While microscopical examination alone is not sufficient for a diagnosis, it is nevertheless advisable to make one in order to eliminate the possibility of sarcoptic mange being the etiological factor. In some instances large spores resembling giant staphylococci may be observed surrounding the hair shaft in a regular mosaic pattern, often eight to ten layers deep, but if one is not familiar with these spores they may be easily overlooked or not recognized. As a positive diagnosis seldom can be made by microscopical examination alone, it is necessary to culture suspected material to identify positively the specific nature of the infection. Such a procedure is, of course, practical only where laboratory facilities are available. Usually a "tentative" diagnosis can probably be made—

1. By ruling out sarcoptic mange.
2. By the (possible) presence or recognition of the large spores surrounding the hair.
3. The contagious nature of the infection.
4. The small, more or less typical scabs on the skin.
5. The absence of marked irritation (at least in cats).
6. The history of the case.

Treatment

Ringworm infection in cats, judging from my own experience, yields readily to the application of various fungicidal agents. One which was used very successfully on cats is a proprietary preparation containing salicylic acid, benzoic acid, chloretone and malachite green. This preparation was applied to the affected parts with a small brush, at intervals of two or three days. Few patients required more than two or three treatments. I understand that malachite green alone has also given satisfactory results on cats.

A formula that has been successfully used for the treatment of ringworm on the hairy parts of the human body [2] and which might prove to be satisfactory for cats and other animals, consists of the following:

Salicylic acid.....1.50 gm.
Chloroform .....30.00 cc.
Dissolve.

This is used by painting the affected areas twice daily until desquamation occurs. It is understood, of course, that large areas should not be treated with this preparation.

In treating cats it is advisable to examine carefully all parts of the body with the hands to detect any new areas of infection, and if found they should be treated before they have an opportunity to develop or spread. In cases where it is practical to do so, it is, of course, advisable to clip cats so as to locate affected areas more easily and also to enable treatment to be applied to better advantage. As already stated, some cases appear to "clear up" spontaneously, which is indeed very fortunate because if it were not so it would be difficult to contend with the disease, as contact with spores can not be avoided under practical conditions. Ringworm infection in cats is so highly contagious that the importance of keeping patients isolated from susceptible animals cannot be too strongly emphasized.

Ringworm Infection in Animals as a Public Health Problem

According to Sabourand,[3] the first record of the transmission of ringworm from cat to man was made by Fox and Blaxall [4] in 1896. However, these authors apparently had no knowledge of *Microsporon felineum,* as the fungus they isolated was not named. Mewborn [5] appears to have been the first to record the transmission of ringworm caused by *Microsporon felineum* from a kitten to a girl. Roberts [6] also isolated a similar organism from a kitten that apparently spread the disease to several adults, six children, a dog and another kitten. More recently (1933), Davidson and

Gregory,[7] of the University of Manitoba, offered very convincing evidence to show that cats not only transmit ringworm infection to humans, but they also record a very interesting case where a boy, suffering from ringworm of the scalp (contracted from an infected kitten) in turn transmitted the infection to a healthy kitten. Another very interesting feature mentioned in the article by Davidson and Gregory is that cats act as carriers of infection without showing any apparent evidence that they themselves are affected. In order to detect these carriers, suspected cats were submitted to the "fluorescent test" by exposure to ultra violet light. It appears that infected hairs contain a water soluble substance which produces a green *fluorescence* when exposed to ultra violet rays passed through "Wood's glass." These authors recommend that pet animals which have been in contact with ringworm patients should be tested to detect carriers by means of this fluorescent test. I am indebted to Dr. Charles Crowe of Chicago for referring me to this work and I would recommend that veterinarians who are seriously interested in ringworm in cats should read this interesting article (loc. cit.). So far as I am personally aware, no owner or person coming in contact with ringworm in cats has become infected. Nevertheless, it is advisable to be rather cautious in handling infected animals and to recommend caution to others because infection in humans is likely to cause considerable trouble and inconvenience.

Summary

Ringworm infection discovered in several cats in Detroit was found to be due to a fungus, *Microsporon felineum*.

Two types of fungi causing ringworm are recognized—the human type, *Microsporon andouini*, which affects man only, and the animal type, *Microsporon lanosum*, which affects animals as well as man. *Microsporon felineum* is considered by some authorities to be an aberrant form of the type species (*lanosum*). The human and animal types can be differentiated only by culture characteristics.

Lesions are described on cats as small, round, raised scaly or scabby areas on various parts of the body, chiefly covered by hair. Infection causes no appreciable irritation or general ill health in cats, but scabs are liable to coalesce, forming larger scabs which cause concern to the owner and are a menace to other animals and man.

Ringworm infection yields readily to treatment. A proprietary preparation, containing salicylic acid, benzoic acid, chloretone and malachite green, gave good results. A solution of malachite green alone or a combination of salicylic acid and chloroform also are reported to be effective.

Ringworm infection in cats seems to be to some extent self-limited, but if this is due to acquired immunity it is of only brief duration.

Recent observations confirm the fact that the animal type of ringworm infection is transmittable to man and that man can pass the infection back to cats and other animals.

Cats can act as carriers and the presence of ringworm in these animals can be determined by green fluorescence produced when affected hairs are exposed to ultra violet light.

The writer does not know of any case where ringworm in man was contracted from cats, but suggests that care be exercised in handling affected animals because the disease in humans may become quite annoying or even serious.

References

1. Jacobson, H. P., "Fungus Diseases, A Clinico-Mycological Text," (Chas. C. Thomas, Publisher).
2. Topical Application in the Treatment of Ringworm, *North American Veterinarian*, 1934, (Dec.) V. 15, No. 12, pp. 23-24.
3. Sabouraud, Les Teignes, Maison, Paris, 1910, p. 229.
4. Fox and Blaxall, *Brit. J. Dermat.*, 1896, 8: 337-359.
5. Mewborn, *New York Med. J.*, 1902, 76:843-849.
6. Roberts, *Brit. J. Dermat*, 1902. 14:327-332.
7. Davidson and Gregory, *Can. Med. Assoc. J.*, 1933, V. 29, No. 3, pp. 242-247.

The Diagnosis of Pregnancy in the Bitch by Palpation

By LEON F. WHITNEY,
New Haven, Connecticut

FOR practical as well as scientific purposes it is often very much worthwhile to be able to determine whether a bitch is pregnant before she shows it by the distention of the abdomen. It is worthwhile for the veterinarian who is consulted and valuable to the dog breeder. It is almost a necessity in the case of certain studies of reproductive phenomena.

Almost anyone with experience can say five or six weeks after breeding whether or not a bitch is going to whelp, especially if she is going to have a large litter; but not everyone can tell at the third week, and few are able to tell until whelping time when a bitch is carrying only one or two puppies.

In the case of phantom pregnancies, so common in bitches, when the abdomen enlarges and the mammary glands increase in size, oftentimes the diagnosis is to the effect that the bitch is pregnant. The increased appetite causes the bitch to eat a great deal and very frequently the dog breeder is misled. On the contrary, many pregnancies which are thought to be phantom pregnancies are not so at all, but are genuine pregnancies which terminate in the resorption of the fetuses. Indeed, so common is this phenomenon that I have been able to determine that it may be the expected behavior of very old bitches. One bitch which lived to be almost 15 years old became pregnant at her last three matings and developed the puppies up to about 28 days after which time they were gradually resorbed. I have noted this in many very old bitches.

In a subsequent paper I shall show how very useful is the ability to diagnose pregnancy in the case of sick bitches. It is for that reason among others that the present paper is submitted at this time. I wish to use certain facts from it in the following paper.

IT WAS during the time when I was accumulating data for my paper, "The Mating Cycle of the Dog" and following that time, that I learned how to diagnose pregnancy by palpation. After having dissected the reproductive tracts of 40 bitches, in all stages of pregnancy, I learned just how and where the uterus lays in the abdomen with relation to the intestines and other organs. Ever since that time I have been carefully recording the size of the developing fetuses, as they felt to my fingers. These impressions were recorded only in the cases where the exact time of copulation was known.

What is felt even by trained fingers is obviously not really the fetus at all. Rather it is the sum total of the fetus, the amniotic fluid surrounding it, the placental membranes and the thickened walls of the uterus. Hereafter in this paper I shall refer to what is felt by the word, "lump," for this describes it accurately. At first the fetus is very much smaller than the total lump. As it becomes older the proportions change so that the fetus constitutes the greater part of what one may feel.

When the lump that one feels is about the size of a large pea, the embryo is slightly smaller than a grain of wheat and jelly-like to the touch. But during the last week of pregnancy the fetuses themselves may be felt distinctly, provided there are only a few in the bitch. This is because the sacs are soft, and the fluid moves aside at the touch of the fingers so that the contour of the fetuses is easily traceable. If there are many fetuses, the abdomen is generally so much distended that it is impossible to get one between the fingers in order to feel of it. Generally the firmness does not go out of the lump which one feels until after the fifth week.

IT IS generally possible to determine pregnancy in the bitch at about 20 days after fertilization. From then on until the 35th day it is quite an easy matter. But after the 35th day the increasing flabbiness of the fetal sac, the greater amount of amniotic fluid and the general increase in the size of the abdomen, make it a very difficult matter. It is no longer necessary because one does not have to palpate then to detect the fetuses. The general appearance of the bitch is enough. But when a bitch is in whelp, it is often possible to keep track of the development of the fetuses from the 20th day right up to whelping, if the litter is a very small one.

IT WILL be well to recall the general construction of the bitch's reproductive tract, in order to better understand where and how to feel for the lumps, if one is interested in determining pregnancy. In the non-pregnant bitch of average size the length of each horn of the uterus is about seven inches. The vagina is about three inches long. I have frequently heard the horns of the uterus referred to as Fallopian tubes. We often hear it said that "the pups develop in the tubes." Such is not the case. The Fallopian tubes in the bitch are very small, and run from the tips of the horns of the uterus in tortuous paths around the capsules which surround the ovaries. They terminate at small inconspicuous slits in the sides of the capsules. When copulation has ceased, the semen from the dog will have passed up the entire length of the uterus, through the Fallopian tubes and entered the capsules around the ovaries. By inserting a medicine dropper through this slit, some fluid can be withdrawn and it will be found to contain spermatozoa.

Very likely fertilization occurs within this capsule, and the fertilized ova are moved through the Fallopian tubes and into the horns of the uterus, where they develop. As they grow the walls of the uterus grow also and the horns of the uterus lengthen. As pregnancy progresses the uterus may be 3½ feet long in a bitch of the size of a German shepherd or a large setter. This length depends largely upon the number of puppies developing. The fetuses are not always placed evenly in the uterus. How much migration there is before attachment we do not know. In a dissected bitch I have found six fetuses in one of the horns and only three in the other. Quite often one finds lumps well up in the uterus so that one has to feel just behind the ribs to feel anything at all. At other times it is possible to feel a lump almost down at the cervix. From the cervix the two parts of the uterus may sometimes run forward among the folds of intestines. Sometimes they lie on the abdominal floor. In the former case, as pregnancy advances, the lumps may be felt almost always under the intestines.

As the uterine horns elongate they gradually twist and turn, making the contortions very difficult to follow. It is therefore only necessary to put the finger on the far side of the abdomen, the thumb on the near side and gently press until the lump is felt. Then by moving the fingers forward or backward others can generally be felt. And as I have said, in the early stages, it is only necessary to feel just above the floor of the abdomen. A great difference will be noted in the size of the lumps felt in the uterus from one day to the next. The growth is very rapid and if a three-day interval elapses between palpations, the difference will be most marked.

I FIND palpation easiest of accomplishment when the bitch is in a standing position. With one hand I hold her by the head, generally pinching the base of one ear to draw her attention and cause her to relax. In the case of large breeds, it requires an assistant to hold the bitch's head, and then both hands may be used. Without an assistant, I find it best to lay a large bitch on her side, and by placing one hand under the side and the other on top, the lumps may be felt.

Some bitches are exceedingly difficult to palpate, because of their tendency to keep their abdominal walls tense. Rubbing the ears and other movements often do not avail, but a steady pressure on the abdomen will usually cause the bitch, in time, to

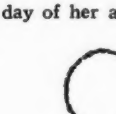
relax enough to determine whether or not she is pregnant. In my experience dogs of the bull terrier type are most difficult, while dogs of the hound or setter type are easiest to palpate.

There is one opportunity for error in this detection of pregnancy by palpation; namely, feeling lumps of feces in the large intestine, and mistaking them for fetuses. When a bitch is constipated, she may have many

Nov. 26th. Bred Tireless to Avenger. This is the fourth day of her acceptance period.

Dec. 16th. Lumps feel this large: (20 days)

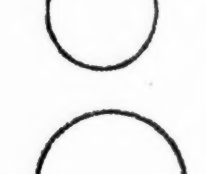
Dec. 17th. Lumps this large: (21 days)



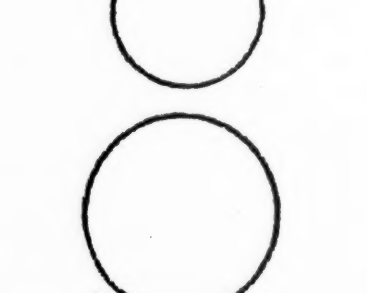
Dec. 19th. Lumps this large: (23 days)

Dec. 22nd. Lumps this large: (26 days)

Dec. 24th. Lumps this large: (28 days)



Dec. 29th. Lumps this large: (33 days)



Dec. 31st. Can't feel a thing. Bitch very large. Going to have big litter.

small hard lumps in the intestine. If a possibility of such confusion exists, it is advisable to give a mild laxative and put her on a diet of laxative food for a day or two, and then palpate again.

FROM the records which I have made of the different sizes of the lumps as gestation progressed, I have been able to construct the following diagrams. In accumulating these data I have palpated the bitches at every possible opportunity. On the preceding page there is given excerpts from notes in my daybook in the case of a single bloodhound bitch. This bitch whelped fourteen puppies, all hale and hearty.

In this case I made no attempt to count the number of lumps. After December 31st it was not possible to distinguish anything because of the distention of the abdomen. On January 27th she whelped her litter. Her normal weight varies around 80 pounds. During late pregnancy she weighed 101 pounds.

From many such records the diagram has been constructed. There will be found to be individual variation in different bitches. I find from my records that one bitch in five matings has never carried her puppies over 60 days. Others doubtless carry theirs for 63, but my own experience leads me to believe that the 61st day after ovulation is more likely than not to be the date of parturition rather than the 63rd day given in most of the whelping tables.

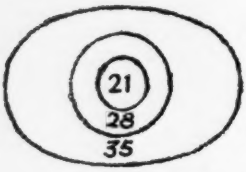
To predict the probable whelping date from the day when the lumps in any bitch feels as shown at 28 days on the diagram, it is well to know something of the past history of the bitch. Where one has a past history of a short gestation period, it is possible to predict very closely when to expect the pups. I have collected a great many data pertinent to the subject. It was noted that the longest time (after the lumps felt as they generally do at 28 days) was 36 days to whelping. The shortest was 32. This was the bitch referred to above. Three times her gestation period was 59 days and twice, 60 days. Two other bitches show a figure of 36 days. In their cases their gestation periods were a full 63 days.

In observing the various points in the chart showing the sizes of the lumps, one will notice that in the early stages there is not the difference one might expect between the various breeds. For instance, in a Schipperke weighing eight pounds, the size of the lumps at 21 days is about half the diameter of the lumps of the St. Bernard at the same day, or about one-eighth the cubical contents. But note that the St. Bernard is 17½ times as heavy. This same dog in better flesh would have weighed 20 times as much, easily. The development in the latter weeks is more along the lines to be expected by the difference in breed size. But even so there is not the difference at whelping that one would expect. Thus a beagle weighing 15 pounds whelped a litter weighing an average of close to four ounces each. The puppies of a Great Dane weighed 17 ounces each at birth. If the puppies of the bigger dog had been proportional to its greater weight they would each have weighed 28 ounces. One litter of puppies from a 28-pound beagle weighed 10 ounces each, and there were six in the litter.

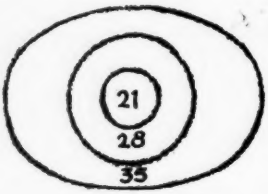
The chart was made not from palpating one dog of each of the breeds shown, but in some cases many. Dozens of mongrels of varying sizes were palpated. None of these is included but it is surprising how closely the size of their lumps checks with those of purebred bitches of similar sizes. I have had the opportunity of examining so many bloodhounds that I ceased recording the size of their lumps. And they are an exceptionally easy breed to palpate because they are flat sided, thin skinned and very yielding to the touch.

The following charts show the relative sizes of the lumps which one feels by palpation through the abdominal walls. These

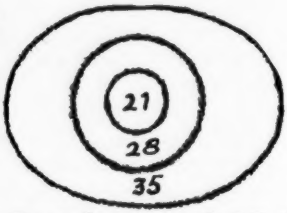
lumps are composed of fetus, amniotic fluid, placental membrane and uterine walls. By comparing the feel of the lumps in any bitch with those shown here, a close approximation of the number of days that the bitch has been pregnant, can be made.



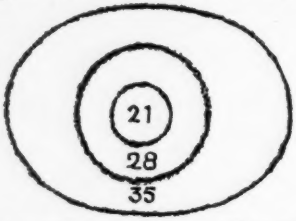
Schipperke - 8 lbs.



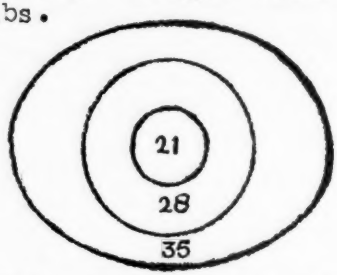
Boston Terrier 13 lbs.



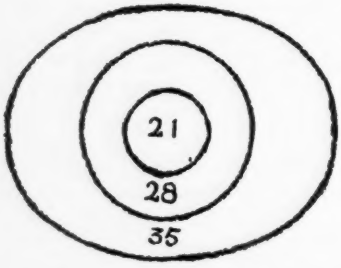
Beagle Hound-18 lbs.



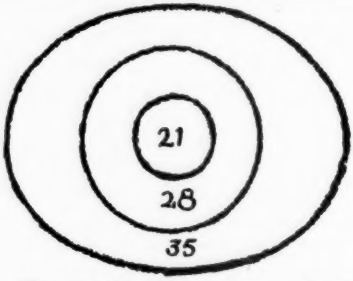
Cocker Spaniel - 24 lbs.



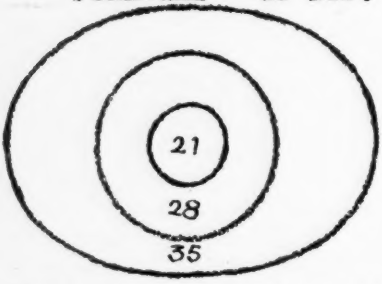
Bull Terrier - 40 lbs.



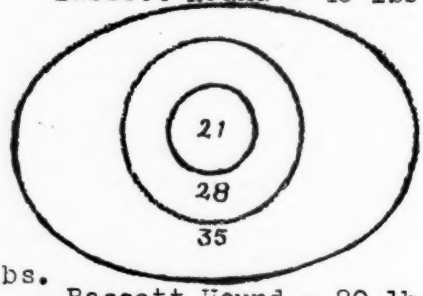
Foxhound - 45 lbs.



Bassett Hound - 45 lbs.

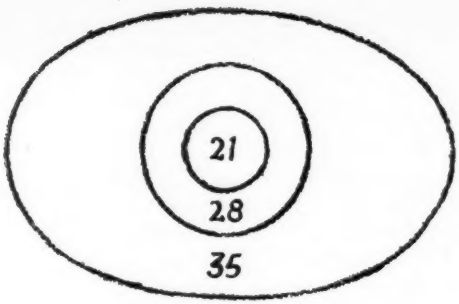


Russian Wolfhound - 60 lbs.

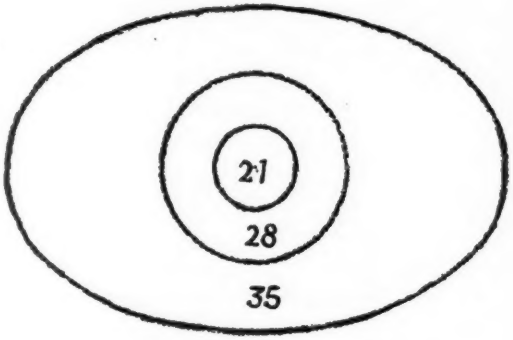


Bassett Hound - 80 lbs.

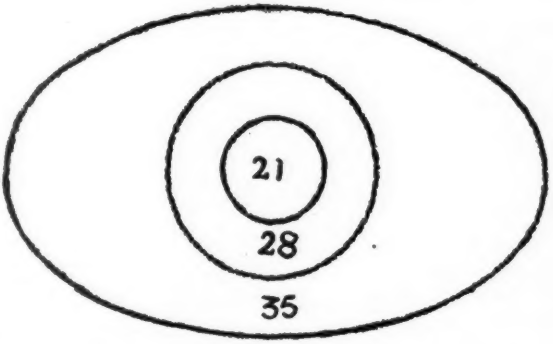
Newfoundland
90 lbs.



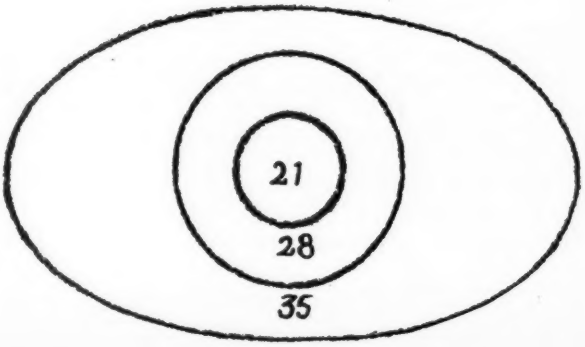
Great Dane
105 lbs.



Irish Wolfhound
120 lbs.



St. Bernard
140 lbs.



Rectal or Postmortem Examination

By SYDNEY P. LEVENE,
Manhattan, Kansas
Kansas State College, '36

"WHAT was the cause of death?" "Colic." How often is this five letter word used to cover a condition that perhaps is worthy of pages of detailed description and discussion as to the etiology. The symptoms were evident, but what was the cause?

Colic is defined as pertaining to the colon; acute abdominal pain. The symptoms may be due to any one or a combination of many conditions, related or irrelevant to the digestive tract—enteroliths, torsion, obstipation, gaseous accumulations, metritis, cystitis, etc., serve to illustrate the point. It is obvious that a knowledge of the cause is of prime importance for diagnosis or successful treatment. Often it is impossible to arrive at a definite diagnosis and resort is had to naming a symptom—colic—to cloak ignorance. In the average case, however, this can be avoided if every available technique for diagnosis is employed. Chief among these is a well-executed, intelligent rectal examination. More concerning the digestive tract can be learned from this one simple procedure than from all the history obtainable. Udall states that 50% of the cases of colic may be diagnosed accurately by this one procedure.

Treatment of colics must be directed at relieving the underlying cause if serious errors are to be avoided. Every veterinarian has his pet formula for the relief of colicy pains and that is as it should be, provided he knows what is at the bottom of those distressing, strength-sapping pains. He should also know whether or not his pet treatment will affect that particular condition. That a single, uniform line of treatment cannot be laid down for all types of colics is clearly indicated by figures cited by Hutyra and Marek (Vol. II), taken from the clinic at Budapest. From 11% to 21% of the colic cases treated were transitory, acute, intestinal catarrh; 12% to 15% were primary meteorism; 6 to 20% were due to obstipation or intestinal impaction; 0.2 to 0.7% were caused by closure of the intestinal lumen and 14% were produced by aneurisms of the mesenteric artery. Records at the clinic of the Veterinary Division of the Kansas State College bear out these figures.

To attempt treatment of such a wide variety of conditions, all manifesting colicy pains, by one method is to sink to the level of the empiric. Such being the case, is it any wonder that many owners of ailing animals seek the advice of these empirics, who though unqualified to treat the sick, have rather mastered the art of showmanship?

The reasons given for not endeavoring to make a thorough checking per rectum are seldom justifiable. True, the procedure is a messy one, but then when properly clothed and having available soap and water, this argument fades. A "rectal" is not only a part of the job, but it has a double value in that the examiner learns the exact conditions and it impresses the owner with the veterinarian's competence, thus enlisting his complete cooperation. He is convinced that everything possible is being done to save the patient.

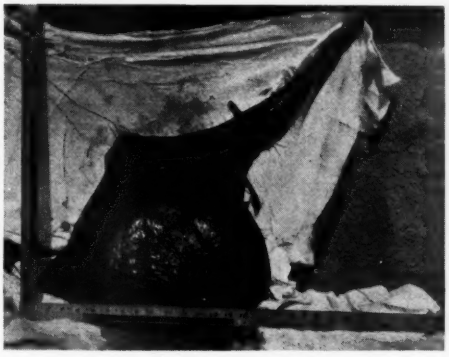
An interesting example is offered in the accompanying illustration of the postmortem findings in a colicky horse. The cause of death was rupture of the stomach. The horse, a 17-year-old gelding, retired polo pony, never troubled with a digestive disturbance, had been ridden occasionally but had spent most of his time grazing at pasture during the day and was stabled at night. At 10:30 one night a call was received to visit this horse. He was in great pain, manifesting all the usual colicy symptoms. He had received his regular feed of grain and hay that evening, which was consumed as usual. At 11:15 P. M., most of the pain suddenly subsided; the animal

became very much depressed; temperature 101.5°F. He made no further attempt to roll and the gait was extremely cautious. The general attitude was suggestive of expectancy.

Gastric lavage was fruitless. Examination per rectum revealed a large, hard, rounded mass filling the left lumbar region. The other structures appeared to be in their normal relationship. These factors coupled with the history, the sudden onset and the general attitude of the patient, pointed unmistakably to acute gastric dilation with displacement. The prognosis was death by morning. Surprise does not adequately describe my mingled feelings the next morning, when upon postmortem examination, the spleen shown in the illustration was found in addition to a ruptured stomach. The entire spleen showed a marked hyperplasia which may be considered as the secondary cause of death; the primary cause being the ruptured stomach. The increased size and weight of the spleen no doubt embarrassed the physiological function of the stomach to such an extent as to prevent passage of the ingesta from it. Fermentation had taken place and the rupture followed. The normal spleen of the horse weighs approximately 35 ounces. This organ weighed 35 pounds. The tumor was in the dorsal third of the spleen and measured 16x20 inches.

This case illustrates several points: (1) A more careful rectal examination would have included the splenic condition in the diagnosis. (2) The owner was convinced that nothing could have saved his horse under the existing conditions. (3) The extra trip to make the postmortem examination was more than repaid by the fact that the diagnosis was substantiated by visual proof to the owner.

A postmortem examination in all colic cases that terminate fatally is a worthwhile investment in advertising, aside from the information it elicits. Perhaps it is showmanship. If the antemortem examination is complete and carefully made, one does not have to fear the exposure of a mistake. Nothing serves better to cement trust and confidence on the part of the client in his veterinarian. Even if a mistake has been made—and who doesn't make one occasionally—the veterinarian is just that much more fortified for the next case. One who will not recognize one's mistakes cannot grow. Further, the postmortem examination may, in a measure, serve to indicate the efficacy of the line of treatment employed and perhaps indicate its modification or revision.



Tumor of the Spleen in a Horse.

In making a rectal examination, it is well to wear some sort of impervious material. The arm should be bared to the shoulder and all jewelry removed from the fingers. Danger of injury to the rectal mucosa is lessened materially by use of a lubricant on the arm, usually a heavy soap lather suffices. Dilation of the anal sphincter is best accomplished by extending the fingers and palm, thus forming a cone. With the hand in this position it is introduced into the rectum with a twisting rather than a straight pushing movement. All fecal material encountered in the rectum and colon should be removed. The feces may be examined at this time for the presence of excessive mucous and adult parasites. If the rectum and colon are found empty, this factor should be given consideration, along with such other points as may be revealed by the examination, before a definite diagnosis is reached.

The arm should be introduced as far forward as possible before attempting any explorations of the abdominal cavity. This

provides a long mesentery attachment, allowing leeway to reach important structures without endangering the intestine or its attachments. At no time is it advisable to thrust the hand forward against the peristaltic action as the mucosa and musculature are easily penetrated. With the arm well forward, it is possible to palpate the kidneys and if the stomach has been displaced, this may be determined by a change in position of the spleen. Normally this organ is beyond the reach of an arm of average length. The dorsal part of the spleen is found in the region of the last thoracic rib. At the brim of the pelvis it is possible to palpate the bladder for calculi or other pathologic conditions. The pelvic flexure of the large colon is slightly to the left and it should be palpated to determine if it is in its proper position and for evidence of impaction.

Occasionally the entrance into the abdominal cavity may seem to be blocked by a tense, cord-like structure, extending down from the lumbar region. This is the colic mesentery. If twisted, it is almost pathognomonic of displacement or torsion of the small colon. In the region of the right flank the cecum may be palpated easily and the consistency of its contents noted. Often a large, hard mass may become lodged in its dorsal third, occluding the two orifices (ileo and colic) or it may be distended with gas. If the impaction is not too hard it may be broken up by massage over a period of a few days. Impactions of the large colon or at the origin of the small colon (region of the left kidney) when they can be palpated, are benefited greatly by massage. This procedure, coupled with the administration of huge amounts of water via the stomach tube, will aid in overcoming some of the most stubborn cases of impaction.

The proper execution of a rectal examination is not without its dangers both to the patient and to the examiner. The question of restraint is one worthy of respect, especially if the animal is in great pain and restless. Safety may be increased in such cases by backing the animal into a single stall and operating over the manger. The use of a side-line also may prove of value in cases apt to strike or kick. It is advisable always to be in position to withdraw the arm quickly. It is well that someone hold the tail during the examination, thus keeping the hair out of the rectum and also serving to throw the horse off balance if he should show an inclination to kick. The greatest danger to the patient is rhexis of the intestinal wall. All palpation should be attempted with the full length of the fingers rather than the tips and finger nails should be trimmed short. This will reduce the hazard and unnecessary hemorrhage.

The examination per rectum when properly made is a valuable asset and should be as much a part of the examination as is the use of a thermometer. Much may be learned through this procedure that would otherwise remain unknown. "The best time for repentance is in advance"; is a good motto to bear in mind when one is tempted to diagnose a digestive disturbance without the benefit of a thorough rectal examination. A failure in this respect will return to haunt the veterinarian when he is called back to make that postmortem examination.

* * * *

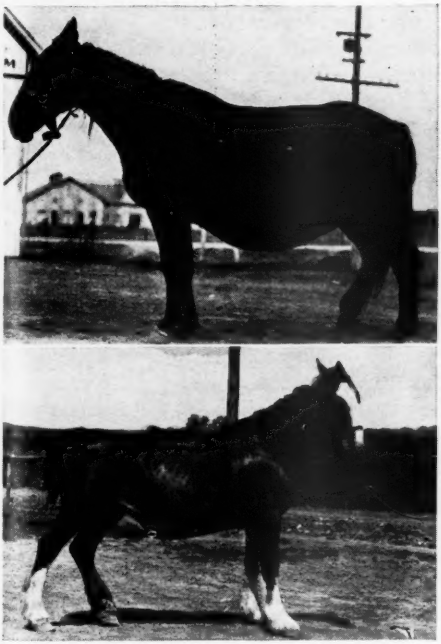
SEMI-RUPTURE OF THE PREPUBIAN TENDON IN A MARE

January 20, 1936, a mare was presented at the veterinary clinic of the Kansas State College with the following history. She was 22 years of age, had never previously been with foal, was bred this time in January, 1935, or about 12 months previously. Her abdomen was sagging and greatly edematous, a condition commonly seen in mares about to suffer a rupture of the prepubian tendon.

The tendon was considered as yet unruptured for several reasons. The abdomen was not as pendulous and sagging as in rupture, the mammary glands were in normal position and not pulled forward as in rupture, the pelvis maintained a normal angle; in rupture of the tendon the pelvis is tilted with the pubis passing downward and backward, the tuber ischii passing up-

ward and forward. The anus and vulva were not sunken and pulled forward as is seen in rupture.

The mare was put in a single stall and a many-tailed bandage made of canvas and leather straps was placed about the abdomen for support. The straps, buckled over the back, were well padded to prevent



Above: Impending rupture of the prepubian tendon. There is great edema of the abdomen but organs otherwise are in normal position. Below: Rupture of the prepubian tendon. Note the position of the mammary glands, the tilt of the pelvis and the swayed back.

pressure necrosis. A few days later the mare was suspended in slings as an additional support. The daily treatment consisted in readjustment of the slings and close inspection for the appearance of any pressure necrosis.

The evening of February 11, she was placed in a box stall without the slings but with the many-tailed bandage still in place. During the night she gave birth to a normal foal without any assistance.

The mare was held for observation for a week. At the end of that time the swelling was as great as ever. An exploratory puncture was made with a 12-gauge needle and a large quantity of yellowish, serous fluid obtained.

An area was shaved on the venter surface of the abdomen, disinfected with tincture of iodine and a small incision made through the skin. The contents of the swelling were found to be a large quantity of clear fluid and small intestines.

She was then given 1½ ounces of chloral hydrate orally and placed on the operating table. The area was again disinfected and a close examination of the swelling made. No hernia ring could be found. The skin incision was sutured with sterile umbilical tape. A rectal examination was made while the mare was on the table and it was found that the left half of the prepubian tendon was ruptured with the right half still intact. It was this unusual circumstance that was responsible for the absence of all usual symptoms of prepubian rupture even though a rupture was present. An antiseptic pack of bichloride of mercury was placed over the incision. Two days later the case was dismissed.

This experience illustrates the great value of rectal exploration. Especially is this true where an abdominal swelling exists the exact nature and cause of which are unknown.

L. A. DEHNER,
Manhattan, Kans. K. S. C., '36.

B. A. I. LOSS A PUBLIC HEALTH SERVICE GAIN

Dr. Maurice C. Hall, Chief of the Zoological Division of the Bureau of Animal Industry, former president of the American Veterinary Medical Association, has resigned his position to accept a similar post with the U. S. Public Health Service. In transferring from the Bureau of Animal Industry to the Public Health Service, Doctor Hall was accompanied by four members of his division, Doctors Eloise B. Cram, Myrna Jones, Willard H. Wright and John Bozicevich.

Dr. B. H. Schwartz succeeds Doctor Hall in the position of Chief of the Zoological Division, Dr. E. W. Price succeeds Doctor Schwartz as Assistant Chief and Dr. Gerard Dickmans succeeds Doctor Cram as senior project leader.

Abstracts

VETERINARY SERVICE IN AUSTRIA

The Austrian Public Health Act[45] of 1909 aims at the control of foot-and-mouth disease, anthrax, blackleg, rinderpest, glanders, sheep pox, dourine, vesicular exanthema of horses and bovines, mange, rabies, hemorrhagic septicemia in pigs, swine erysipelas, fowl cholera, fowl plague and clinically diagnosable bovine tuberculosis. The Federal Ministry of Agriculture has added furunculosis of fish, and certain contagious diseases of bees to the schedule of notifiable diseases. The veterinary staff controls the transport of animals, inspects markets, sales-yards, live animals and meat and controls the disposal of carcasses. Compensation is given by the Treasury.

Rinderpest was eradicated in 1880, and pleuro-pneumonia in 1914. In 1924, the order imposing a general uniform veterinary inspection of all meat was introduced.

The veterinary service is directed by the author who is responsible to the Minister of Agriculture. Each province of the federation has its veterinary section with an independent head, and district veterinary surgeons are appointed for provinces and for the more important towns. The district veterinarians attend to questions of breeding, treatment of disease and vaccination, and the municipal veterinarians control abattoirs and meat inspection.

The federal institute at Mödling provides all the necessary vaccines and sera and undertakes the diagnosis of contagious disease.

By agreement with surrounding countries, veterinary control of animal transport secures protection against the introduction of contagious diseases. Particular attention is being paid to the prophylaxis of bovine tuberculosis and the campaign against this disease will recommence as soon as the financial position of the country is improved.

[45] Kasper, K., 1935. Les services vétérinaires de l'Autriche (The Austrian Veterinary Services). *Bull. Off. internat. Epiz.*, 9, pp. 578-86. Abst. in *Vet. Bul.*, 6:2, p. 184.

DISEASE OF THE NEW-BORN FOAL

The prevention of septicemia and pyemia infection[50] in colts consists principally in prophylactic measures, such as breeding regulations to improve the constitution, hygienic regulations for the selection of the parent animals, care in selecting the breeding date, proper management of the mare during gestation and, finally, hygienic precautions during foaling and nursing. Should infection take place, then the stable has to be disinfected, the afterbirth has to be disposed of to prevent spread, the colt will have to be vaccinated, and proper treatment is to be given to the infected mare.

* * * *

ANESTHESIA FOR CASTRATION

General anesthesia for castration[46] is often contraindicated on account of the danger of complications. Local and epidural anesthesia, likewise, are rather impractical. Lumbar anesthesia provides complete painlessness for an operation on the testes and spermatic cord, and the operation can be performed on the standing animal.

Eibl's technique is as follows: In the young steer, the os sacrum is palpated with both thumbs, moving them forward. On the location of the transition to the lumbar vertebra a groove is felt in the relaxed muscle, just above the foramen lumbo-sacrale. There the hair is clipped and the skin is cleaned and disinfected. A long needle or canula is thrust down vertically. As a rule the vertebral canal is easily located at the first attempt. If the exact spot has not been hit, the needle should be retracted into the subcutis and thrust slantingly forward. As soon as the anesthesia is complete, no further aid is needed for the castration. Bulls heavier than six or seven hundred pounds are unsuitable for this technique.

In boars, the location of the foramen lumbo-sacrale is in the obtuse angle formed by the lumbar vertebra and the os sacrum.

[50] Zeh, O., 1935. Zeitgemässe Betrachtungen über Fohlenlähme; (Observations Concerning Navel-Ill in Colts). *Veterinärmediz. Nachrichten*, 1:1, p. 11.

[46] Eibl, K., 1935. Die Lumbalanesthesie in der täglichen Praxis bei Jungbullen und Schweinen (Lumbar Anesthesia in Cattle and Pig Practice). *Münch. Tierärztl. Wchnschr.*, 86:13, pp. 145-48.

The canula is inserted in the median line, about 15 to 20cm distant from the root of the tail. When the needle has reached the lowest point, then a little pressure is applied to perforate the ligamentum interarcuale which crosses the foramen lumbo-sacrale. This causes the needle to enter the vertebral canal directly. The solution is then injected. Anesthesia starts within five minutes, reaching its maximum in 15 to 20 minutes. It lasts, altogether, about one hour.

PULLORUM INFECTION IN EGGS

Eggs [47] infected with *Salmonella pullorum* develop extensive necrotic lesions of the yolk resorption lamellae and a sero-exudative inflammation of the wall of the yolk sac. The fetal membranes disclose a circumscribed inflammation caused by the bacterial invasion. The bacteria are first found in the yolk from whence they spread to the capillaries by way of the villi of the vitelline sac. Thus the wall of the yolk sac, the fetal membranes and the embryo become infected by way of the circulatory system. Shortly before the embryo dies, some of the bacteria break into the visceral organs, but they do not cause a reaction in the organs. The tissue lesions seen in the baby chicks have never been observed in embryos. The reason for the death of the embryo must be sought in a disturbance of the nutritional and metabolic functions, caused by the destruction of the resorption lamellae.

MISPLACED HEART MOST FREQUENT IN CALVES

Ectopy of the heart [48] is most common in calves and pigs. The cervical or thoracic form predominates. Abdominal ectopy is exceedingly rare. The cause of this heart anomaly is due to the arrest of the development at a certain stage of embryonal life. On account of the interruption of this process, the blood circulatory system changes to conform to extra-uterine conditions of life. While the ectopical heart is able to develop normally in size, it is unable to function normally. An adverse position of the fetus in the uterus may predispose to a heart anomaly, but it is not likely to be the cause of the anomaly. The cause of heart anomalies in domestic animals is not to be found in the theory of inflammation.

PARASITIC PARAPLEGY IN CATS

Parasitic paresis of cats in Chile is characterized first by a very slight lameness of one hind leg. This lameness manifests itself especially after rest. Often, merely a swaying of the hind quarter is noticed. Gradually the lameness increases, resulting in a string-halt like leg movement, and finally in complete paraplegy. The cause of this malady is a metastrongyle (*Gurltia paralysans*), which lives in the veins of the spinal cord. This worm feeds upon blood and lays its eggs in the bloodstream, causing the formation of organized thrombi. The eggs are laid ungrooved and develop in the veins to a certain furrowed stage, but never into larvae. Sensibility is never disturbed. The intermediate host of the parasite is assumed to be a lizard.

THE ROLE OF ALIMENTATION IN ANIMAL PRODUCTION

Great progress [51] has been made in the feeding of farm animals, formerly in providing rations approximately ample in proteins, fats, carbohydrates, mineral substances and vitamins and their quantitative relations to one another, but, more recently, in establishing, with exactitude, the effect of determined rations on growth, meat, milk, work and reproductive ability.

The *isodynamic* theory of nutrition, that is to say, the doctrine based upon the caloric value of the sugar, starch, fat and albumen that a ration contains is erroneous. At the present time, concentrated food material

[47] Fürst, W., 1935. Beiträge zur Kenntnis der bei der Kückenruhr während der embryonalen Entwickelung auftretenden pathologisch anatomischen und pathologisch histologischen Veränderungen; (Pullorum Disease in the Chick Embryo). Thesis, University of Berlin.

[48] Svab, B., 1935. Ectopia cordis; (Displacement of the Heart). *Publications cliniques de l'Ecole des hautes études vétérinaues,* 12:5, pp. 81-107.

[49] Wolffhügel, K., 1934. Paraplegia cruralis parasitaria felis durch Gurltia paralysans n.g., n.sp.; (Paraplegia in Cats Caused by a Nematode). *Zeitschr. f. Inf. Kokh. etc. d. Haust.*, 46:½, pp. 28-47.

[51] Lahaye, J., 1935. Du role de l'alimentation dans l'amélioration du bétail. *Annales de Mélicine Vétérinaire,* 80:7, July, 1935.

has attracted interest all the world understands, and it appears to be here to stay. Moreover, mineral substances, water, chaff, and the bran of cereals once reputed to have but little nutritive value came into their own with an understanding of deficiency diseases. These have become "noble feeds."

Another forward step was taken when the unit value of feeds and, therefore, the ration began to be measured and the actual needs of an animal could thereby be approximately calculated. But, it should not be considered that there is nothing more to learn and that feeding is not susceptible to great improvement and probably revolutionary changes. On the contrary, it is more nearly true that the alimentation of animals is at a turning point, since the metabolism of the intake is, after all, the important factor in adequate nourishment.

To step up production at any cost, domestic animals have been profoundly transformed; so the mechanism of utilization as well as the units of forage must be considered. The former can be overwhelmed and defeat the purpose of the latter. That is to say, the actual productive value of the ration and the capacity of the organism to appropriate it to its needs are inseparable.

More is now known of "forage units" than of the number of such units an animal requires for optimum production. The breeder is waiting for this latter information. For example, the requirement for a cow weighing 600 kg. giving 20 liters of milk is the important question. It is easy enough to demonstrate the immediate benefits of a proper ration, but not so easy to calculate the results of excessive alimentation and the functional damage done beyond the alimentary canal. It is so common for dairy farmers to complain that it is always their best cows that fall sick. The incompatibility between heavy feeding and corporeal vigor, endurance and resistance is well known to experienced breeders. There is a limit beyond which the functions of the body must not be surpassed or forced.

Besides the feed itself, the basis of progress lies in two things: (1), the animal, which should be well selected, and (2), its exploitation, that is to say, the method of using it. These facts are current today and universally admitted, but inasmuch as the question is one of the intrinsic qualities of the individual animal, it is evident that perfect feeding is not easy to approach even in the best regulated establishments. Moreover, rations containing the same feeds as expressed by "forage units," costing the same price, have not the same effects on different individuals of the same species. In short, some feeds of the same genre are better than others, because they have optimum qualitative and quantitative associations. The author discusses at length the physiological reason for balancing rations and the intricate factors involved; showing how the unbalanced basal ration, with an excess of certain factors, mixed with one of high nutritive value somewhere deficient may have a great economy in animal production where the knowledge of feeds is utilized.

On the whole, animals are going through a catastrophic period because breeders have contravened the laws of Nature and at the same time have not yet seized upon the broad concepts of science, giving exaggerated importance to certain details and forgetting essentials which are making a cortege of deficiency diseases pass triumphantly in review, enfeebling health, lowering resistence and deranging the nervous system. As a consequence, despite advances in the knowledge of feeding, animal production is not progressing as it should. In dairy herds, matters have not improved, on the whole, since the World War. Abortion, mastitis, tuberculosis, and sterility, have increased and uniformity of production and local varieties of cows have disappeared from the markets. In short, Nature has been set aside and science has yet to replace Her in practice. In fine, animals cannot be maintained in health without a complete alimentation in every period of their lives. The feeding of animals is a national problem. The author discusses, at length, six dramatic problems to be ironed out to correct the flaws of animal nutrition.

EMBREE GOES TO NEW YORK CENTRAL LINES

Dr. W. J. Embree, since 1919 chief veterinarian of the Western Weighing and Inspection Bureau, has resigned that position to accept the position of Agricultural Representative and Live Stock Agent with the New York Central railroad. His headquarters will be at Columbus, Ohio.

Doctor Embree was graduated from the Chicago Veterinary College in 1910 and engaged in general practice for four years. In 1914, he became associated with the Interstate Serum Company as production manager and later, with the Universal Serum Company in the same capacity. In 1917 he was engaged by the Western Weighing and Inspection Bureau at the organization of its live stock service for the western railways, and stationed at the National Stock Yards in East St. Louis. In 1919, he was promoted to chief veterinarian of the organization with headquarters in Chicago.

The Bureau carried on inspection at Chicago, East St. Louis, Kansas City, St. Joseph, Omaha, Sioux City, St. Paul, Denver, Oklahoma City, Fort Worth and San Antonio. It becoming apparent that the loss of live stock in transit could be reduced if proper precaution were taken by the shipper, an extensive educational program by means of lantern slides, moving pictures and lectures was undertaken among livestock shippers and carried on extensively from 1920 to 1930. The loss of animals in transit and the claims against the railroads for loss was reduced more than 50% by this and other measures.

The veterinary personnel of the Western Weighing and Inspection Bureau was increased from 15 in 1918 to 46 in 1930. By this latter date, the veterinary service had largely accomplished its objective in reducing live stock losses in transit to what was regarded by the carriers as normal, or perhaps irreducible. In addition to this, the large use of trucks for the transportation of animals for slaughter and the need of the railroads for retrenchment growing out of the depression, brought about a considerable reduction in the personnel of the Bureau.

The New York Central Lines have carried on a very active agricultural development program for a matter of 20 years, and on the resignation of Mr. Earle G. Reed, Agricultural Representative and Live Stock Agent at Columbus, Doctor Embree was offered the position and accepted it.

Doctor Embree's experience in the Western Weighing and Inspection Bureau demonstrated the many matters of common interest to veterinarians and railroads, and convinced him of the advantages that would accrue to the railroad from maintaining a close contact with veterinarians in the area from which live stock are shipped over it. It will be Doctor Embree's purpose to become thoroughly acquainted with all veterinarians in the territory of the New York Central System and encourage them to feel an interest in the welfare of the railroad and the shippers of live stock.

COMBATTING AFTER EFFECTS OF FLOODS

Promptly responding to urgent appeals from the stricken flood area, emergency shipments of Typhoid Fever Vaccine, Smallpox Vaccine, Tetanus Antitoxin, and Scarlet Fever Antitoxin, were sent by plane, truck, and messengers in private cars by Sharp & Dohme, Philadelphia, to help in fighting threatened epidemics.

The entire weight of the twenty-four hundred employes of Sharp & Dohme was thrown into the task of supplying emergency needs. Representatives from outside the area converged from New York and New England into the Connecticut River Valley. Others from Ohio, Virginia, and local men from Philadelphia and the Pennsylvania and West Virginia districts were all equipped and instructed to operate in all ways with State Police, Red Cross, Coast Guard, Health Officials, and in any manner possible to get to the worst sections as quickly as possible.

Biological Laboratories at Glenolden, Penna., which are the largest in the world, have been ordered to stand by night and day for emergencies. Supplies of Serums and Vaccines are maintained there at all times in subterranean refrigerator rooms as large as a city block, where they can be immediately released when a catastrophe of this magnitude occurs.

Connecticut is the latest addition to the list of states practically free of tuberculosis. This brings the number of states in the modified accredited area to 39, and leaves only nine states—California, South Dakota, Nebraska, Maryland, Pennsylvania, New Jersey, New York, Rhode Island and Vermont—in the non-accredited list.

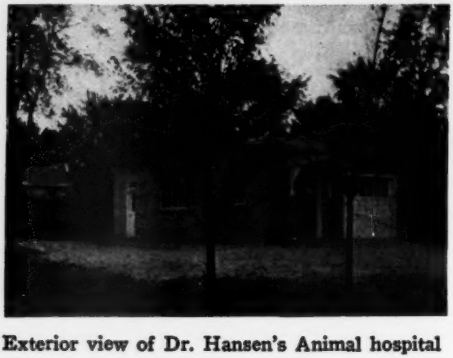
HOSPITAL FOR ANIMALS IN A SMALL TOWN

Graduating and entering veterinary practice from scratch during the depression year of 1931, in a little more than four years I have managed to erect a small animal hospital that, while not at all beautiful from an artistic point of view, it is my idea of practical facilities a dog and cat hospital in a small town such as this, (about 5,000 inhabitants). Of course, it would not suffice in a large city.

The exterior is of plain concrete block construction, which will take a coat of white cement plaster admirably. Some day we shall give it such a coating, for the sake of appearance. It is a one-

story building, with firewall type of roof. The roof is covered with soldered tin, with flashings over the walls. The pitch of the roof is one-fourth inch to the foot. The windows are residential type French windows that swing outward. They have steel sash with double strength glass. The drive is surfaced with oiled crushed stone. In the spring I plan to build a rock garden along the garage side of the building, on a slope to the west. I have the rocks now, having gathered them from far and near in the course of daily calls.

The interior is finished in smooth plaster over metal lath. The floors are concrete and are sloped toward the center, where an ample floor drain is provided in each of the wards and in the operating room. These make for easy cleaning; walls, floors



Exterior view of Dr. Hansen's Animal hospital

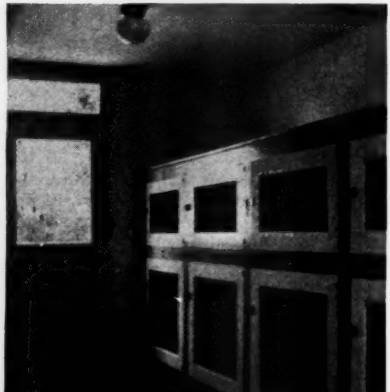
and all can be washed down in a hurry. The office is painted ivory down to dado heighth, and from there down is tan with a brown base. The other rooms are all painted white with smooth enamel dado and black base. All ceilings are white.

The building is heated by a residential type jacketed boiler, equipped with thermostatically controlled blower for using buckwheat coal. There is a hot water radiator in each room, including the garage. The boiler, coal bin and an automatic electric water heater are conveniently located in the garage part of the building.

Each kennel room is equipped with a porcelain sink, and the operating room has a large cabinet sink with drain board. All sinks have chrome fixtures.

The main ward has twelve kennels arranged in a double tier. Each has a floor three feet square; the lower kennels being three feet high, the upper two feet. The kennels are made of wood, with inside corners rounded. The fronts are doors with steel bars. The kennels are painted light grey with white doors. The bars in the doors are galvanized. Newspapers are used for bedding. The isolation ward has six kennels of the same type. More dogs may be accommodated by adding more kennels as the wards are plenty large. Another row of kennels can be put on top of the present ones when needed, as all the ceilings are eight feet high.

The isolation ward can be entered only through the garage. This tends to avoid contamination. The floor drain and sink drain are so constructed that even though all became plugged at once, it would



View of double deck kennels in main ward.

still be impossible for a back flow to the rest of the building from the isolation ward.

The office contains a desk and chairs, bookcase, my gun cabinet, filing cabinets and a telephone. The office doors are varnished to match the furnishings. All other doors in the hospital are enameled white.

The operating room contains a white, enameled examination table, an operating table, instrument stand and a large cabinet, ten feet long, which holds all the instruments, dressings, drugs, etc., out of sight and out of the dust. I am much pleased with my operating room.

In choosing a lot for this building, I procured a corner of three regular village lots. It measures 120 feet by 140 feet inside the sidewalks. It is located in the best residential section of town and the neighbors do not object; the building being practically sound proof they are not annoyed at all. Our present home adjoins the lot.

The cost of the building was about $4,000, plus the lot. While my place is not a model for the modern city hospital, I think that it is one of the best types that I could have built, taking in consideration the location and the cost. It has been in use three months and is working out very satisfactorily and all who have visited it, including several veterinarians, have praised it.

H. E. HANSEN,
Ballston Spa, N. Y.

DOCTOR CONRAD SUCCUMBS AFTER LONG ILLNESS

Burton W. Conrad, born September 11, 1875, at Sabetha, Kansas, died March 14, 1936, at his home in Sabetha after being confined to his bed for several months with heart disease. Doctor Conrad was graduated in 1895 from the Kansas State Agricultural College and in 1907 from the Kansas City Veterinary College. He had practiced in Sabetha since the latter date. He was active in veterinary association matters, having been president of the Kansas Veterinary Medical Association and a member of the Executive Board of both the Kansas state association and of the A. V. M. A. He was likewise active in civic and other affairs affecting his community, having been president of the Sabetha Chamber of Commerce, the Sabetha Golf Club, Kiwanis Club and Commander of the local post of the American Legion. Doctor Conrad was always a football enthusiast, and played on the college teams both at Manhattan and Kansas City and on a Sabetha town team, altogether 16 years. He served in the Veterinary Corps during the World War.

He is survived by his widow, two daughters, ten grandchildren and four sisters. A considerable number of veterinarians attended the funeral services.

ARMY VETERINARY SERVICE

So much of par. 31, S. O., 219, W. D., 1935, as amended by par. 14, S. O., 242, W. D., 1935, as assigns Captain Arvo T. Thompson, to duty at the Army Medical Center, Washington, D. C., is further amended so as to assign him, upon completion of his present tour of foreign service, to duty at the Letterman General Hospital, Presidio of San Francisco, Calif.

Colonel Alfred L. Mason is, in addition to his other duties at the Presidio of San Francisco, Calif., assigned to duty as attending veterinarian at Letterman General Hospital.

The promotion of Major Geo. W. Brewer to the grade of lieutenant colonel with rank from March 8, 1936, is announced.

Veterinary Reserve Corps

New Acceptances—Brown, Theodore Wilson, First Lieutenant, Westville, Fla.; Conner, Roy Earl, First Lieutenant, 1407 Gold, Centralia, Wash.; Court, Maurice John, First Lieutenant, Lowell, Mich.; Morkis, Edward Stanley, First Lieutenant, 107 N. Pearl St., Brockton, Mass.

New Assignments to Active Duty with CCC—Burke, Edward J., First Lieutenant, Ft. Williams, Me.; Lancaster, Harry R., First Lieutenant, Ft. McClellan, Ala.

Termination of Assignment to Active Duty—Hoyt, Kenneth R., First Lieutenant, Seattle Q. M. D. (disability); Leach, Benjamin F., First Lieutenant, Ft. Williams, Me.

EXAMINATION FOR NEBRASKA LICENSE

The Bureau of Examining Boards will hold its next examination for license to practice veterinary medicine and surgery in Nebraska on June 29-30, 1936, at the State House, Lincoln. All applications must be on file at least 15 days prior to the date of examination.

OKLAHOMA LICENSE EXAMINATION

The Oklahoma State Board of Veterinary Medical Examiners will hold their next regular examination at the State Capitol Building, Oklahoma City, May 12, 1936.

There are good locations in Oklahoma still unoccupied—Walter H. Martin, Secretary.

LOUISIANA VET. MED. ASS'N

The Louisiana Veterinary Medical Association held its annual meeting in connection with the Louisiana State University Short Course in Baton Rouge, Louisiana, February 26th and 27th, 1936. This meeting was the largest and best from every angle that has ever been held in Louisiana's history. Contributors to the program included: Dr. J. C. Flynn, Pres. of A. V. M. A., C. R. Donham, Ohio State University, T. W. Sigler, Indiana, Frank Kitchen, South Carolina and J. F. DeVine, New York. There were 25 members of the A.V. M.A. present and a total of 49 veterinarians at the meeting.

Officers elected for the ensuing year were: Hamlet Moore, New Orleans, President; G. A. Bryson, Shreveport, Vice-President, and C. M. Heflin, Baton Rouge, Secretary and Treasurer. The next meeting will be held in Baton Rouge, Louisiana in February, 1937.

C. M. Heflin.

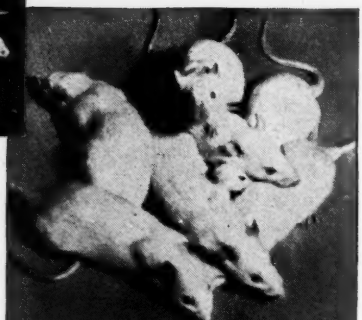
DR. T. E. MUNCE SUCCUMBS TO PNEUMONIA

Thomas Edward Munce was born in Washington County, Pennsylvania in 1877. He was graduated from the School of Veterinary Medicine, University of Pennsylvania, in 1904; engaged in general practice at Washington, Pa., 1904-07; was employed by the Live Stock Sanitary Board of Pennsylvania as a meat hygiene agent for a year; he served the State of Pennsylvania as Deputy State Veterinarian, 1909-19, and as State Veterinarian, 1919-34. He represented District No. 2 on the Executive Board of the A. V. M. A., 1918-28, and was President of the A. V. M. A., 1928-29.

Doctor Munce died of pneumonia at his home in Harrisburg on March 17, 1936, after an illness of two weeks.

STARTLING DIFFERENCE IN DOG FOODS SHOWN BY TEST

Mother with 23-day old litter. The litter, in this picture, is 70% underweight.



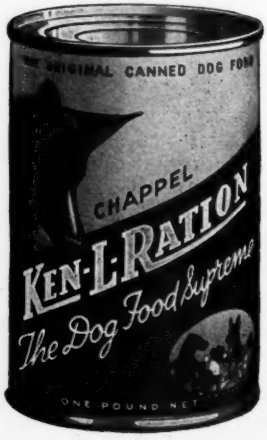
Here is the same litter 25 days later at nearly normal weight. Note the difference!

■ Here is PROOF that Ken-L-Ration not only maintains the animal body in sound health but that it also has the rare and exclusive ability of bringing the animal body back to normal health from the verge of death! Only a food of real biologic value could pass this test—the severest of all feeding tests.

The mother rat in the above picture was fed exclusively on a canned dog food (not a cheap 5c food.) She could never fully rear a healthy, big family. The essentials were not in her body because they had not been in her food.

The litter of seven shown in the top photograph was near death from malnutrition. They were put on an exclusive diet of Ken-L-Ration. What happened? Study the other picture! This vast improvement took place in 25 days. The weak, scrawny, under-nourished pups made substantial increases in weight, grew silky coats, stronger legs; became clear-eyed and gave the evident appearance, as shown in the photograph, of nutritional adequacy. After 25 days feeding on Ken-L-Ration, the seven rats weighed 697 grams, a gain of 543grams!

Write for free book, "A Dog's Life," which gives further startling information about Biologic Value in dog foods.



CHAPPEL BROS. INC.
503 Peoples Ave. Rockford, Illinois

"Dejem"

CANINE DISTEMPER COMPOUND

"Dejem" is decidedly beneficial to dogs with DISTEMPER. It also controls the severe sickness following inoculations.

"Dejem" 16 oz. size, 1 bot.....$ 2.75
3 bot. .....$6.75, 6 bot.....$12.00

Mangan & Co., Laboratories
294-298 E. 161st St. New York

C. A. Brandly recently resigned his position as assistant professor of bacteriology at the Kansas State College to accept the position of pathologist in the Division of Animal Pathology and Hygiene at the University of Illinois, succeeding Dr. E. H. Barger, resigned.

* * * *

The 1936 catalog of the Norden Laboratories, Lincoln, Nebr., is being distributed. It lists that institution's well-known Certified Brand of veterinary biological and pharmaceutical products, veterinary instruments and supplies. The catalog comprises 256 pages, illustrating, describing and giving the prices of a very complete line.

Cal-Vita-Phos Discs

A Vitamized Calcium Phosphorous

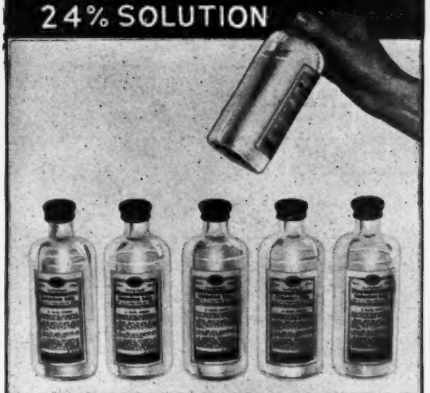
SMALL ANIMAL FOOD MODIFIER

A very effective building agent having a guaranteed high vitamin D content. Does not contain any cheap filler. Causes no bloating.

R. J. STRASENBURGH CO.
Rochester, N. Y.
Pharmaceutical Chemists Since 1886

NORCALCINATE

24% SOLUTION



non-precipitating!

Norden Certified NORCALCINATE (Reg. U. S. Pat. Off. No. 331627)

24% Solution (full dose calcium gluconate) has met the severest tests without precipitating.

Definite records show that it has been subjected to repeated freezing and thawing during this severe winter, as well as to long periods of agitation, without being affected in any way.

Norcalcinate is Safe!

Specific for milk fever, and other hypocalcemias.

Large 300 cc bottles.....Six $3.80
Small animal pkg. 6-10 cc..... 1.00

Norden Certified

NORCALCINATE

(Reg. U. S. Pat. Off. No. 331627)

with **DEXTROSE**

for milk fever complicated with acetonemia.

FULL DOSE 500 cc bottles.....Six $4.50

Order from

NORDEN LABORATORIES
"The Mark of Quality"
LINCOLN · NEBRASKA

For Better . . . Faster . . .
Easier Dog Clipping

The NEW STEWART CLIPMASTER

New Easy-Grip handle only 2" in diameter

78% MORE POWERFUL

Veterinarians who have tested the new Clipmaster say it is the finest, fastest, easiest to use dog clipper of all time.

Clipmaster has powerful, air-cooled, ball bearing motor inside the special composition handle. Perfect balance for clipping in any position.

WHAT USERS SAY

"Got a compliment on every dog I clipped with Clipmaster."
"Paid for itself the first week I had it."
"Clipped 73 dogs without resharpening."
"Gave excellent service on 300 dogs last summer."

Clipmaster complete with 20 feet of cord, for use on any 110-volt A. C. or D. C., only $16.95. For other voltages $18.95. (Slightly higher West of Denver.) At your dealer's or send us $2.00. Pay balance on arrival. Write for catalog showing complete line of STEWART clipping and shearing machines. Made and guaranteed by Chicago Flexible Shaft Co., 5516 Roosevelt Road, Chicago, Illinois.

46 YEARS MAKING QUALITY PRODUCTS.

FAMOUS CLINIC TO BE REPEATED

The nationally famous clinic of the Eastern Iowa Veterinary Association will be held June 17, 1936, as formerly, at the sales barn of Dr. F. M. Wilson, Mechanicsville, Iowa.

The innovation, inaugurated by practitioners in Eastern Iowa five years ago, of holding an annual clinic to which members bring their difficult, unusual and other interesting cases available at the time, to be studied during a whole day given over exclusively to the clinical side of veterinary medicine, has been widely emulated by practitioners in other sections and is becoming more popular year by year. However, the Mechanicsville clinic continues to lead in attendance and in the number and variety of cases studied, its only near rival being the clinic held at Peoria, Illinois, Fair Grounds by the Mississippi Valley Veterinary Association.

* * * *

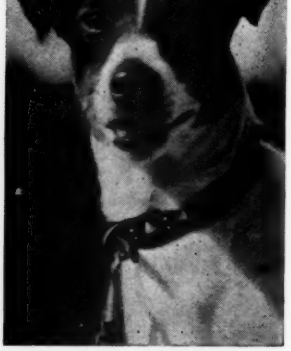
AILMENTS OF IOWA HORSES

The Eastern Iowa Veterinary Association reports an unusual amount of illness among horses with the opening of spring farm work, the trouble being mainly digestive ailments with fatalities attaining a disturbing percentage. Responsibility for the condition is placed by Iowa practitioners mainly upon the incomplete rations on which horses have been fed during the past winter, parasitic in-

HERE'S ONE DOG FOOD I can depend on—

If you want your dog to have the kind of common sense diet he ought to have, you can depend on Milk-Bone. For more than thirty years Milk-Bone has been made of the food elements dogs really need, and in proportions that have been proved correct. Every ingredient in Milk-Bone is as clean and pure as the food in your own kitchen. Get Milk-Bone from your dealer today, or send a post-card for a free sample to: Dept. L-536, Milk-Bone Bakery, National Biscuit Company, 449 West 14th Street, New York City.

MADE IN THE
NATIONAL BISCUIT COMPANY'S
MILK-BONE BAKERY



MILK-BONE
DOG & PUPPY BISCUITS

THIS SYMBOL CAN WORK FOR YOUR PROFIT

It can help to bring you in contact with more of the type of dog owners and breeders who seek professional service in the management of their animals.

It can produce an extra source of income directly, on its own account.

It stands for the dog food which is rapidly gaining in demand because its nutritive value is *proving* its superiority to veterinarians everywhere.

Formulated on a genuinely scientific rather than commercial basis, it is the result of several years of biological research under direction of Dr. John W. Patton. Many veterinarians have found it worthy of their professional endorsement and useful to them in their professional services.

This food is not extensively distributed through retail stores. It has not been "promoted" to compete on a straight commercial basis. The veterinarian who has it for sale is in a position to attract the patronage of the well-informed dog owners who are seeking Gaines Food in increasing numbers.

Write for agency proposal.

GAINES MEAT AND MILK MEAL COOKED

The Granular Form

GAINES KRUNCHON MEAT & MILK MEAL IN PRESSED FORM

The Hardened Form

GAINES FOOD COMPANY

BOX H-6, SHERBURNE, N. Y.

FISTONE

● Foremost for a quarter of a century in the minds of those who have made a study of scientific control of many types of animal diseases.

Fistone is the original internal treatment for fistula of the withers, poll evil, quittor and other suppurative and catarrhal conditions.

Used by leading veterinarians the world over.

THE FISTONE AND APPLIANCE COMPANY
College Corner, Ohio.

Trial Order—One doz. boxes (once only).$ 8.00
Regular Price—One doz. boxes..... 10.00
One-half doz. boxes..... 5.00

Dr.....

Address.....

festations and the sequels to an unusual amount of distemper, strangles and influenza. For horses that for any reason did not receive bot treatment during the winter, these Iowa practitioners regard it as good practice to administer this treatment throughout the month of April to hasten the elimination of bots and rid the animals of other internal parasites.

MISMANAGEMENT PENALTY

In a recent book, Professor Sears points out that the entire history of man's tinkering with the land, since the dawn of agriculture, has been one of destruction, mismanagement, and waste. The Mayas lost their civilization because they couldn't manage land. The disastrous floods and famines of China are the result of land mismanagement.

In North America, the land has gone so far toward destruction in 300 years that large portions are already irretrievably lost.

Immediate action is necessary to save the rest, not just digging a few ditches and building some dams, but a strong land-management policy that looks to the future.

The present users of the land must be enlightened, says Professor Sears, and if necessary, their selfishness and wastefulness must be forcibly curbed.

Rotation of Dogs' Diet Not Necessary

If Proper Ration Is Fed

Food chemists of Wilson & Co., Inc., have solved the problem of meeting a dog's need for variety in food with a single product—IDEAL DOG FOOD!

Ideal Dog Food is therefore distinctive among dog foods because it has been scientifically prepared to meet the MIXED DIET requirements of a dog or a cat. Substitution or rotation of foods is not necessary.

Ideal Dog Food is also the leader in economical feeding because of the high percentage of food value of its wholesome, nourishing ingredients.

SAMPLES FURNISHED UPON REQUEST

GENERAL OFFICES: WILSON & CO. CHICAGO, ILL.